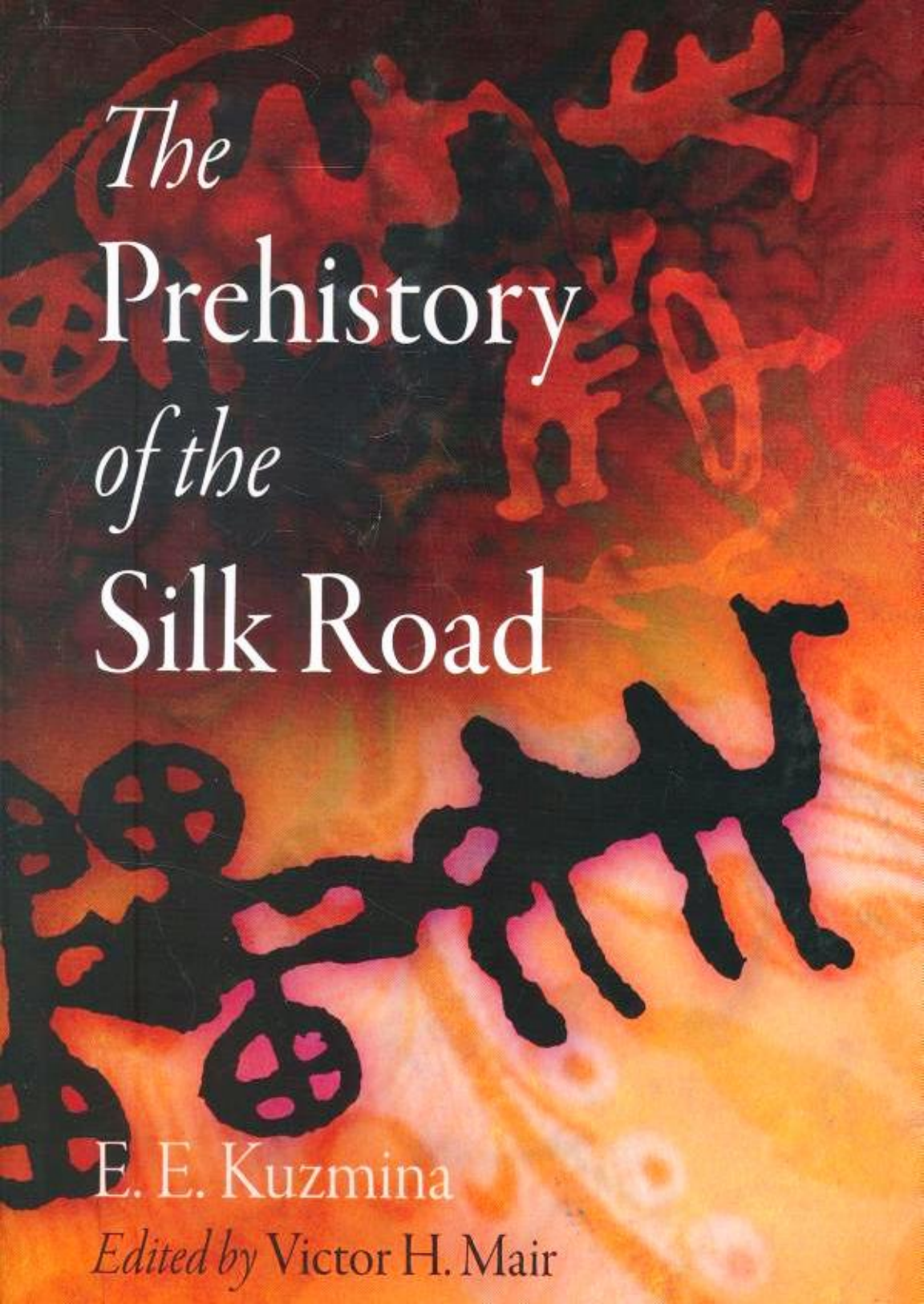
The
Prehistory
of the
Silk Road
E. E. Kuzmina
Edited by Victor H. Mair

The Prehistory of the Silk Road

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The Prehistory of the Silk Road

E. E. KUZMINA

EDITED BY VICTOR H. MAIR

PENN

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Editor's Foreword

Elena Kuzmina's *The Prehistory of the Silk Road* is a major accomplishment, and I am proud to have had a hand in making it a reality. There is, of course, tremendous interest in the Silk Road, but we have had to wait for this volume by Dr. Kuzmina to describe and analyze the preconditions that led to its establishment. The story she tells is a fascinating one that encompasses nearly the whole of Eurasia in Bronze Age and Early Iron Age times.

Having met Elena Kuzmina at several conferences in the United States and Kazakhstan during the mid-1990s, I had come to realize that she possesses a phenomenal wealth of knowledge about the Bronze Age cultures of Central Asia. I read a number of her books and articles, especially *Otkuda prishli Indoarii?* (*Whence Came the Indo-Aryans?*), and I was all the more impressed by her masterful command of the archaeological data concerning the early spread of Indo-European peoples (particularly the Indo-Iranians) toward the east. Consequently, around 1997, I asked Dr. Kuzmina if she would be willing to write a book about the prehistory of the Silk Road. Since no one had ever attempted to undertake a systematic study of the overall situation in Central Asia during the millennia preceding the establishment of the historical Silk Road, such a work was obviously much needed. Naturally, I was delighted when Dr. Kuzmina agreed to write the volume I had requested.

The Prehistory of the Silk Road is fundamentally a work of historical reconstruction. As such, it is complementary to archaeological fieldwork. Although these two approaches may be guided by different questions and executed in disparate manners, both are vital for an appreciation of a contested set of problems in the study of prehistory.

Kuzmina's monograph constitutes an excellent summary and distillation of a specific historical tradition of research. Her work is rooted in a particular school of Soviet learning, itself now a focus of study in

anthropological and historical circles. *The Prehistory of the Silk Road*, however, is not purely and solely an instance of Soviet-style scholarship, for Dr. Kuzmina is also quite conversant with Western approaches and publications. These she has incorporated in her discussion of various phenomena, without jeopardizing the foundations of her own tradition. Thus, the present volume represents a high-level synthesis of past research—in both Russian and Western languages—on the emergence of mobility and exchange across the Eurasian Steppe. One may fairly say that it constitutes a fundamental investigation of the central questions on this subject that have been raised during the past century. As such, the task that Dr. Kuzmina set for herself is nothing short of monumental, and her achievement is commensurately remarkable.

On the whole, the thinking in this volume derives from diverse intellectual traditions (Soviet/Marxist, Russian, Chinese, and Western). Thus, it is a cultural-historical reconstruction of issues that have been debated in various arenas for many decades; Dr. Kuzmina herself has been a major player in these debates for nearly fifty years.

Perhaps one of the most daunting aspects of making Dr. Kuzmina's book available to an English-speaking audience is the question of how to cope with the various scholarly backgrounds from which it emanates. For instance, it is perfectly natural for Russian academicians (as it is for Chinese intellectuals, for that matter) to speak of ethnogenesis, genetic relationships, and even race, whereas these are all more or less sensitive topics in American society, and are consequently commonly avoided. Moreover, since current Western researchers customarily discount the morphological analysis of human physical types that is altogether normal in Russia and China, I have felt compelled to make certain adjustments in the way such topics are broached. For example, Western scholars, at most, speak of gene pools, but they are very cautious about referring to dolichocephaly and Mongoloids. While trying to maintain fidelity to Dr. Kuzmina's wording and data as much as possible, I have often chosen circumlocutions to prevent unnecessary distraction from clouding her main arguments. Similarly, I have usually changed Dr. Kuzmina's use of the word "tribes" to "peoples," "groups," or the like, and have substituted for outmoded Marxist terminology such as "productive economy" expressions that are more readily apprehensible to an American audience. For simplicity's sake, I have retained the recurring term "farmer" instead of replacing it with the more cumbersome "agriculturalist" or the more familiar, but historically inaccurate, "peasant." As for her use of the term "barbarians," I have not replaced this word, since she intends it in the specific, nonderogatory sense of "intrusive groups appearing in a settled population." I have also found it convenient in some cases to retain her archaic, generic

usage of "car" and "cattle." Furthermore, Russian (and former Soviet) archaeologists and historians have their own elaborate system of dating, chronology, and periodization. In this regard, I have preferred not to make any adjustments in Dr. Kuzmina's presentation, because I believe that it is important for Western scholars to understand the Russian (and former Soviet) approach.

Due to her profound and intimate knowledge of the scholarship on the Eurasian Steppe in prehistory, Dr. Kuzmina commands the literature on this subject better than anyone else alive. This is surely true of the Russian-language sources, and her command of non-Russian language materials is likewise awe-inspiring. Consequently, the capacious bibliographies alone will make *The Prehistory of the Silk Road* a frequently consulted resource.

In this volume, Dr. Kuzmina clarifies numerous issues that had hitherto remained obscure or mysterious. For instance, she sifts through the widely scattered evidence concerning the earliest wheeled transport and convincingly shows that the first chariots were developed, not in Mesopotamia as had previously been alleged, but in the southern Urals and the Pontic Steppe in the vicinity of the Black Sea. She also presents compelling archaeological evidence for the introduction of pastoralism to the northwestern fringes of the East Asian Heartland during the third millennium B.C., which perfectly matches the latest results of ancient DNA research on sheep. Another of Dr. Kuzmina's outstanding achievements in this work is the ordering of Central Asian Bronze Age cultures and their correlation with the archaeological cultures of Europe.

The regions under discussion possess considerable ecological, cultural, and artistic diversity. It is no mean feat for Dr. Kuzmina to subsume these vast spaces under a unified approach and to make sense of them as a whole. Similarly, the author incorporates enormous amounts of material concerning climate, geography, and culture (much of it hitherto unavailable in English), synthesizing her findings into a compact, integral presentation. Because of the density of the data, this volume will undoubtedly demand concentration on the part of the reader. The ample rewards in comprehending Bronze Age Central Asia, however, will certainly render the effort worthwhile.

To make the most of one's encounter with *The Prehistory of the Silk Road*, one needs to acquaint oneself with climatological terms like "pluvial" and "Holocene," and occasionally be willing to look up the location of far-flung places in a good atlas. For unfamiliar archaeological terminology, the reader may consult J. P. Mallory and D. Q. Adams, eds., *Encyclopedia of Indo-European Culture* (London: Fitzroy Dearborn, 1997), which is both up-to-date and authoritative.

I am confident that anyone who is captivated by the history of the Silk Road or Central Asia will find in this work much that is of value. Dr. Kuzmina's unique ability to assemble a tremendous amount of archaeological data and marshal them in a coherent, convincing fashion will surely prove rewarding to readers from many different fields and backgrounds. With that in mind, it is my pleasure to offer this volume to specialists and laypersons alike.

Among those who have looked over the entire manuscript at various stages, and who have contributed to making the book that resulted from it better, are the following: J. P. Mallory, Nicola Di Cosmo, Katheryn Linduff, Emma Bunker, Sandra Olsen, Karen Rubinson, Rostislav Berezkin, Tanya Storch, and Paula Roberts. In addition to checking the entire manuscript, David Anthony has kindly answered specific technical questions. My indebtedness to Claudia Chang is particularly great. Drawing on her extensive first-hand experience conducting archaeological investigations in Central Asia and her familiarity with Russian-language publications on this area, she went carefully through every sentence of the manuscript, contributing much to its accuracy and idiomatic expression. Finally, in preparing the manuscript for publication, Suzanne Dorf and Noreen O'Connor-Abel made numerous improvements in the text. I am deeply grateful to all of these individuals for helping to improve this book in various ways.

In closing, I would like to express the wish that this volume will be only one in a whole series of works that introduce Russian studies on Central Asia to the English-speaking world. Considering the tremendous (and growing) importance of Central Asia, it is a pity that so few people outside of Russia have access to the rich Russian-language scholarship on this region. Russian research on Central Asia is second to none, and there is a compelling need to make it more widely available to those who do not read that language. The intrinsic significance and high quality of Dr. Kuzmina's signal book make it a most appropriate beginning, but I fervently hope that it will not be the last.

A Note on Transcription

Two of the most difficult aspects of translating and editing this volume have been the multiplicity of transcription systems for Russian and its corollary, the lack of any broadly recognized standard for rendering Russian terms and names in Roman letters. In general, I have attempted to adhere to the transcription system recommended by my Russian colleagues, but this has been complicated by the fact that there are many terms widely recognized in English scholarly literature that take other forms in more strict transliterations (e.g., *darya* [instead of *dar'ya*], Tripolye [instead of Tripol'e], Afanasievo [instead of Afanas'evo], and so forth). In such cases, I have usually stayed with the conventional English spelling to avoid confusing readers who are already familiar with the latter. For this volume, we have adopted a combination of the systems of the Library of Congress, the U.S. Board on Geographic Names, and the Tozzer Library at Harvard University. Our main purposes in doing so have been to make our transliterations look and sound natural to English-speaking readers, and to avoid cumbersome diacriticals. In the case of well-established spellings for proper nouns (personal and place names) and technical terms, we have generally followed custom rather than strict adherence to any set of rules.

Another, still more challenging, set of transcriptional problems consists of names and terms from Chinese, Uyghur, and other languages that have been filtered through Russian. Russian (i.e., Cyrillic) transcriptions of Chinese, for example, treat Sinitic phonemes differently than does English, so it is often hard to determine the correct transcription in English unless one knows for sure the precise name, place, or term that is specified in the Russian. Because I am acquainted with most of the sites and cultures referred to by Kuzmina, I was usually able to recognize the doubly disguised transcriptions she used. Occasionally, however, I was not entirely certain of the original form of the

Chinese, Uyghur, and other names and terms. In such cases, I simply rendered the Cyrillic transcriptions in Roman letters.

Likewise, until recently, there were many different systems for transcribing the sounds of Chinese characters in Roman letters (French, German, English, etc.). When these transcriptions are converted into Cyrillic, it is sometimes difficult to recover the original Modern Standard Mandarin sounds they are intended to represent. As much as possible, however, we have endeavored to convey the sounds of Chinese characters in the official romanization of the Peoples' Republic of China known as Hanyu Pinyin.

Similar problems exist with the conversion of Cyrillic transcriptions of Greek, Latin, Arabic, Persian, and Turkic names and terms into Roman letters. To the extent that it is feasible, we have tried to present these names and terms in the forms in which they are best known in English.

Introduction

Recent years have seen a great increase in public interest in the remote past of Central Asia. The contribution made by the ancient peoples of that vast region to the history of civilization throughout the world is now widely recognized.[1]

One of the major phenomena in the history of the Old World is the Great Silk Road, in ancient times and in the Middle Ages the trade route between China, the Eurasian Steppe, Central Asia, India, Western Asia, and Europe, which then went on to the Byzantine Empire, Venice, and beyond (Map 1). The Road was used for transporting silk from China, while in the opposite direction, from Rome and other countries, traders brought to the Celestial Empire glassware, jewelry, and other goods of high aesthetic value.

This was the Road that for many centuries saw the movement of *people, objects, and ideas*. Ethnic migrations, trade that was at first conducted in stages and later by caravan, the spread of advanced technologies and ideological conceptions—all were part of the process by which the achievements of the different peoples of Eurasia blended into a universal stream that led to the advance of the Old World as a whole.

The majority of the Silk Road routes went through the territory of the Eurasian Steppe (i.e., present-day Ukraine, Russia, and Kazakhstan), whose peoples were participants and mediators in this cultural exchange. When were those relations established and along which routes were they realized?

Early ancient geographers and historians in Europe were not yet aware of the eastern regions of the Old World, their geographical horizons being limited by Western India. Neither *Gesperiodos* or *Periegesis* (Tour around the world) by Hecataeus of Miletus (fl. sixth–fifth century B.C.), *The History* by Herodotus (fifth century B.C.), the works of Alexander the Great's tutor Aristotle, for whom beyond India began

"the outer sea, whose bounds are unknown to the denizens of our part of the world," nor even *The Geography* by Eratosthenes, the famous geographer and curator of the library of Alexandria (third-second centuries B.C.), made any mention of China. But, at the same time, information gradually increased concerning the peoples that populated the areas to the north of Iran, by the Oxus (Amu Darya) and Jaxartes (Syr Darya) rivers, the Bactrian camels and Sogdians, and also about their northern nomadic neighbors, the Scythians, whose land stretched from the boundaries of Central Asia up to the Danube (A. M. Petrov 1995; Pyankov 1997). It was only in A.D. 43 that the Roman geographer Pomponius Mela in his work *De situ orbis libri III* described the country of Seres, that is, of the people of "the silk country" (from Latin *sericum*, "silk"), locating it to the north of India and to the east of Bactria and Sogdiana (A. M. Petrov 1995; map 13). The very name of the Great (or Big) Silk Road appeared for the first time as early as the fourth century A.D., in the twenty-third book of *The History* by Ammianus Marcellinus.

The opening of this famous route, however, is usually referred to as taking place in the second century B.C., when the Chinese emperor sent Zhang Qian on an embassy to the West. On returning from his long journey and adventures, Zhang Qian described traveling through the deserts of the Tarim Basin and the Tian Shan ("Heavenly Mountains") and the riches of the thriving countries of Parthia, Bactria, and Ferghana, where he had seen wonderful horses, tall and golden. (Paleozoologists have established that these were horses of the Nisaean breed, descendants of the elite horses of the Andronovo Culture and the ancestors of the modern Akhal Teké horses.) Legends of the magic steed borrowed from Iranian mythology gained a firm hold in Chinese mythology (Kuzmina[2] 1977a, with bibliography). To obtain these wonderful horses, Chinese emperors would later send their emissaries to Ferghana and wage several bloody wars.

But the principal consequence of Zhang Qian's embassy came with the beginning of the silk trade. The route used to carry it, rechristened the Silk Road (*die Seidenstrasse*) in 1877 by Richthofen (1878, 454), connected China with Western Asia and India as well as Europe.

Based on the Chinese chronicles and other evidence of ancient authors, such as Pliny the Elder (*Naturalis Historia*, VI, 53–54), Dionysius Periegetes (*Geographici Graeci minores*, vol. 2, p. 1864), and Ptolemy (*Geography*, VI, 15, 1–3; 16, 1–8; VIII, 24), the efforts of several generations of scholars (Ritter 1837; V. V. Grigor'ev 1873; Tomaschek 1888; Stein 1904; 1907; 1928; Berthelot 1930; Hermann 1931; Markwart 1938; Mandelshtam 1959; Murzaev 1957; Shiratori 1957; M. P. Petrov 1966; 1967; Humbach 1972; Pyankov 1988; Lubo-Lesnichenko 1988) helped establish that the northern route of the Silk Road went from

Lop Nor through Kucha and Karashar along the Tian Shan Mountains and by the Tarim River to Kashgar, through the Tersakdyvan Pass to Ferghana and further along the Syr Darya across the Steppe to the Southern Urals and on to the Lower Volga and the Black Sea North Littoral; or from Ferghana to Samarkand and, crossing the Amu Darya, to Iran and Western Asia. The southern Road went from Lop Nor along the northern side of the Kunlun Range, along the Yarkand Darya to Tashkurghan, and further to Wakhan in the Pamirs, and either through passes to Merv or southward to India through Gilgit and Kashmir to Gandhara, ending at the mouth of the Indus (Mandelshtam 1959, 43; Lubo-Lesnichenko 1988, 364, 365, map 10).

There also existed a section of the southern Road from Wakhan over the Karakoram Ridge into Swat and further along the Indus (Jettmar 1980). A route that is supposed to have gone along the Pamirs through Karatagh and Karategin (Pyankov 1988, 218–19) is less likely, due to its extreme difficulty.

Silk was exported from China to the West; in return, China obtained nephrite from Khotan, glassware, silverware, and adornments from the Mediterranean region, and horses and furs from the nomads of the Steppe.

The functioning of this route, however, goes back to earlier times. Herodotus (VII, 23) wrote about long-distance trade in the Steppe inhabited by Scythians in the fifth century B.C. This went from Tanais-on-the-Don to the Urals and further to the Altai (Chlenova 1983). P. Reinecke (1897) was the first to show, based on the widespread presence of a particular type of art depicting certain animals (deer, tigers, etc.), that there were contacts throughout the vast area from the Black Sea Littoral to China in the seventh to fourth centuries B.C. The contacts are also proved by the finding of articles made of Chinese cotton and silk fabrics in Pazyryk, and of bronze mirrors in Pazyryk, Minusinsk, and Eastern Kazakhstan (Lubo-Lesnichenko 1961; 1975).

At present no doubt remains that some parts of the Road began functioning as early as the Bronze Age. One of its sections was used for transporting lapis lazuli from Badakhshan to Western Asia, Egypt, and India, from the third millennium B.C. on (Sarianidi 1968). People also exported turquoise from Sogdiana. Beads imported from Bactria and Sogdiana were found in the burials of certain pastoral tribes of the second millennium B.C. These included the Ural region (where lapis lazuli was found in Sintashta and Ushkatta and turquoise in Alabuga), Gurdush, near Bukhara, in which lapis lazuli, agate, and turquoise in the shape of the Maltese cross were discovered, and even in Siberia, where turquoise was found in Rostovka, again shaped like the Maltese cross, in Sopka II (Kuzmina 1988, 51, 52).

In the third millennium B.C., the Nephrite Road came into existence: nephrite (i.e., jade) quarried in Khotan and Yarkand was transported to China, where it was already widely used by the time of the Longshan Culture (Willets 1965, 44) and was particularly evident in the Zhou dynasty.[3]

In the Bronze Age, relations were established between China and Transbaikalia, where, in the vicinity of nephrite deposits, clay tripods of the *li* type dating from the turn of the second to the first millennium B.C. have been found (Okladnikov 1959). In the second millennium B.C., nephrite became familiar to the farmers of Central Asia and to the livestock-herding tribes in the Steppe (Rtveladze 1995, 14). Beads made of jade or its imitations were found in burial grounds of the Andronovo Culture in the Urals, at Alakul, Uskatta; in Kazakhstan, at Aishrak, Kanai; and in Siberia, at Rostovka (Kuzmina 1988, 52). Nephrite objects were part of the burial complexes at Turbino (Bader 1964), Okunevo, and related sites.

Thus, the southern part of the Silk Road routes ran along the traces of the old Lapis Lazuli Road, laid in Western Asia as early as the third to second millennium B.C., and also along the splendid road built by the rulers of the Persian Empire to connect all the satrapies of their vast domain—from Egypt and Asia Minor to Sardis and Persepolis and further eastward to India and the satrapies of Central Asia, up to the land of Saka. This was the route taken later by Alexander the Great after his defeat of Darius III, the last of the Persian (Achaemenid) rulers.

But the major—and crucial—part of the Great Silk Road routes went through the northern regions of Central Asia and the Eurasian Steppe, whose peoples were active participants and mediators in cultural contacts from China to Europe and Southern Central Asia (Map 2). It is the history of these Steppe routes of the future Great Silk Road, and the fortunes of the Steppe peoples that employed them, that will be the main focus of the present work.

The Eurasian Steppe stretches over five thousand miles, from the Danube to the central sections of the Great Wall of China (Map 3). It is a zone that for millennia saw the spread of goods, innovative technologies, new religious beliefs and artistic images, and, finally, of certain ethnic groups that came to determine the ethnogeny of various peoples, including those who spoke Indo-European languages. In the words of A. M. Petrov (1995, 46), the Great Silk Road is "by no means just a road. . . . It is a huge, fluid historical and cultural space over which, in ancient times and the Middle Ages, the trans-migration between different peoples from the extreme ends of Asia to the Western countries was realized."

For many centuries the populations of the Steppe had a nomadic way of life, contributing to their role as middlemen on the Silk Road routes. But what was the lifestyle of the Steppe tribes, what was their role in the history of Eurasia, and how did these contacts develop?

Nomadic peoples inhabit one-fifth of the globe: these are the fishermen, hunters, and reindeer-breeders of the northern parts of Eurasia and America, the itinerant hunters and gatherers of the Americas, Africa, and Australia, the Gypsies, and, lastly, the migratory cattle breeders (Adrianov 1987, 53). Some researchers use the word "nomads" to embrace all these peoples. The term "nomad" itself, however, comes from the Greek word *nomas*, "wandering in search of pasture," and it is in this original meaning that it entered the Russian historical tradition (Rudenko 1961; Markov 1976; Vainshtein 1991; Khazanov 1984); it is also used extensively, following C. D. Forde's example (Forde 1963), in ethnology abroad. In the context of this work, the word "nomads" denotes the nomadic and seminomadic pastoral peoples that populated the broad belt of Steppe, deserts, and highlands in Eurasia. It should be noted that "cattle" in this context includes sheep, goats, and other animals that may be pastured in herds and flocks. Hereafter we shall refer to such groups as "pastoral peoples" or "nomads."

The issue of the role of nomads in history has long been on scholars' minds. Arnold Toynbee (1935; Zlatkin 1971) saw in the mobility of pastoral nomads the dynamic force that determined the succession of stages in the cultural and ethnic development of the Old World.

Much attention to the role of the pastoral nomads of the Steppe was paid by the researchers of the New French Historical School, or the Annales School, particularly by F. Braudel (1986). He introduced the notion of "la longue durée," that is, of the long temporal span of global processes, later called by Emmanuel Le Roy Ladurie "still history." Braudel sees the presence of pastoral nomads as a disruptive force often interrupting periods of slow historical processes, allowing for rapid change and oscillation. The Steppe area stretched along the border of the Old World civilization from the Atlantic to the Pacific, serving as a buffer zone. "When these horse-breeders or camel-breeders happen to clash with each other, when a drought or a demographic increase occurs, this compels nomads to abandon their pastures and invade their neighbors. . . . This has palpable repercussions thousands of kilometers away. . . . In the epoch that seems to epitomize slowness, these people epitomize great rapidity and unexpectedness. . . . The relay is passed all the way from Germany to China" (Braudel 1986, 110, 111).

The Soviet scientific tradition, on the contrary, emphasized the relatively static character of nomadic societies. When attempting to fit the history of the people of the Eurasian Steppe into the Procrustean

framework of Marxist social and economic formulations, Soviet historians divided the culture of the Steppe inhabitants into periods based solely on their synchronization with the neighboring farming societies (Khazanov 1973, 5–10; 1975, 32–35; 251–74; for criticism, see NAA 1980).

No less open to discussion are issues of the origins of nomadic pastoralism. As far back as the classical epoch, the theory of three stages of economic history was put forward, reflected by Varro (116–27 B.C.) in his tract *De re rustica*: (1) consumption of natural products; (2) livestock herding; and (3) plow cultivation. This conception prevailed for almost two millennia until, in the late nineteenth century, German scholars who studied the development of food production (farming and herding) managed to demonstrate that livestock herding had not preceded farming, but that the two processes developed simultaneously and were interrelated (Hahn 1896). These conclusions were verified reliably in paleozoological and paleobotanical studies of the materials from sites belonging to the epoch of the Neolithic revolution (Shnirelman 1980; 1989).

The reasons for the transition from the complex farming and pastoral economy to the specific economic and cultural type of nomadic pastoralism are still the subject of heated debates. O. Lattimore (1967; 1979) advanced a popular hypothesis adopted by many Western scholars, in which the transition to pastoral nomadism was due to the pressure of the surplus population of the farming regions on the periphery, which caused parts of the population to migrate into marginal areas unsuitable for farming—these groups then were forced into nomadism.

A different approach to the reasons for this development is taken by specialists on the history of the Eurasian Steppe. According to Gryaznov (1955, 1957), the transition to a nomadic existence resulted naturally from the growth of the livestock population and the accumulation of experience in conducting the pastoralist economy. This point of view is accepted by most Russian archaeologists. Yet many researchers stress the role of geographic factors and climatic changes in stimulating the process.

The date of the establishment of nomadism in the Steppe is estimated in quite different ways. A. Toynbee, proceeding from general theoretical considerations, assigned it to the fourth to third millennium B.C. The majority of Russian scholars, on the contrary, hold that economic and cultural types of nomadic livestock herding took shape only as early as the Scythian epoch and, accordingly, date its establishment to the mid- or early first millennium B.C.

In addition, some researchers believe that the transition from the complex farming and livestock economy occurred suddenly, arising within one or two generations, while others contend that it was a long, gradual process that extended over centuries or millennia.

The later history of nomadic societies also is viewed variously: A. M. Khazanov, for instance, insists that the evolution of nomads "was not a continuous, progressive process," and that, "in the course of almost three millennia in the nomadic world of the Eurasian Steppe, movement in a circle clearly prevailed over progressive [i.e., linear] evolution" (Khazanov 1975, 265, 273); whereas M. P. Gryaznov (1955), S. S. Chernikov (1960), S. I. Vainshtein (1991, 288–90), and others single out two periods: the period of the early nomads, which ended in the mid-first millennium B.C. and was characterized generally by the nomadic horde and by the decay of the clan system in favor of rising confederacies; and that of the late nomads, characterized by such cultural innovations as the collapsible yurt, the precursors of stirrups, nomadism in small ethnic groups, and the predominance of patriarchal and feudal relations. These issues were discussed in the 1980s in the pages of the journal *Soviet Ethnography*.

Thus, despite many years of active study and a large volume of works on the history of the Steppe livestock herders who established Transeurasian contacts along the future Silk Road routes, many questions concerning their history remain open. In the present work, therefore, I will attempt to trace the cultural evolution of the population of the Eurasian Steppe and to assess in light of new materials the various hypotheses concerning the character and dynamics of its cultural evolution, the prevailing directions of cultural exchange at different stages, and the intensity of contacts along certain Silk Road tracks in different historical epochs.

Given the paramount importance of the role of transportation along these future routes, special attention will be paid to issues of the domestication and use of the horse and the camel, and to the spread of wheeled transport and horse chariots.

Chapter 1

The Dynamics of the Eurasian Steppe Ecology

And let us keep in mind the original fragility of man in the face of the colossal forces of Nature.

F. Braudel, The Structures of Everyday Life

The role of the environment in the history of human communities was evaluated even in ancient times: Hippocrates (c. 460–c. 370 B.C.), in his tract *On Air, Waters, and Places*, advanced an idea about the influence of geographical factors and climate on the human physical constitution and personality and on human social systems. The French Encyclopedist Montesquieu, regarded as the founder of the Geographic School, held that landscape, soil, and climate determined the spirit of a people and the character of their social development. The French sociologists of the Geographic School contributed a great deal to the substantiation of the role of geographical factors in the cultural development of peoples of different regions. However, Soviet science rejected the environmental determinism of the German school of geopolitics due to its use in Nazi doctrine, which caused the whole idea to be discredited for a long time, particularly among Soviet scientists. There the determining factor in history was understood to be not the regular laws of interaction between man and Nature, but the succession of production modes as a result of class struggle (Fedorov 1972).

However, a new modeling of the world system, carried out by the Club of Rome in the 1970s, revealed a pessimistic forecast resulting from ecological processes. It showed that the threshold of the biosphere's stability had been disturbed several times, threatening a global catastrophe in the immediate future, and this stimulated a worldwide boom in the study of ecology.

The notion of "ecology" as it applied to zoology was introduced as early as the nineteenth century by E. Haeckel, and in the mid-twentieth century it was established as a scientific study of the general laws of the

system of all the components of the biosphere, including man. In recent years, Russian science after Yu. Odum (1975) has shown an increasing interest in this issue (*Obshchestvo i prirodnaya sreda* 1980; Depenchuk, Krisachenko 1987; Balandin, Bondarev 1988; Rakhilin 1989; and so on).

The historians of the French Annales School attach great importance to ecological issues. F. Braudel (1949, 21) wrote that "the history of people is in their close interrelation with the earth, which they tread and feed on, the history of a continuous dialogue of man and Nature which determines global processes of slow time." He assigned a significant role to the study of unstable but long-term periods of equilibrium between man, climate, and soil, and spoke about the climatic rhythms and the demographic processes which determine the potentials and limits of the evolution of civilization.

In the late nineteenth and early twentieth centuries, European and American scholars, first in geography and then in sociology, introduced the notion of "human ecology," demonstrating that man, like other biological species of the planet, not only influences the environment, but also is affected by it.

The most comprehensive expression of the ecological approach to history is given in American researcher L. White's comparative culturology (1959). His notion is based on the idea of cultural evolution as an extrasomatic adaptation of human communities to environmental influence. Regarding culture as an objective category, White identified its three components: technological, social, and ideological. Using Charles Darwin's ideas on evolution, White sets forth a model for cultural evolution that suggests that overcoming a crisis is a stimulus to cultural innovation. An important place in White's conception belongs to the humanistic ideas of cultural relativism, which acknowledges biological equality, the equal prospect of each ethnic culture to develop independently, giving grounds for the comparative culturological analysis of human cultures on both a synchronic and diachronic basis.

Criticism of White's conception in terms of orthodox Marxism is unconvincing (Murav'ev 1988; Viktorova 1989). His ideas have been accepted by many American scholars and form the basis of the explanations of L. Binford, K. Flannery, and others of the causes and character of the Neolithic revolution (Flannery 1965; Shnirelman 1978).

White's conception also influenced a number of leading Russian researchers. One should mention, first of all, culturologist Eh. S. Markaryan (1973; 1981). Notwithstanding his bitter criticism of White's views, he accepted, and took as a basis of his own conception, White's main thesis, according to which cultures adapt to environmental conditions,

ensuring the survival of mankind. This tenet lies at the heart of Markaryan's system analysis of cultural evolution.

White's influence is felt also in the works of S. A. Arutyunov (1989), T. I. Alekseeva (1986), and, particularly, V. P. Alekseev (1971; 1984; 1993), who substantiated the meaning of the ecological approach not only to human biological evolution but also to human social development. He emphasized the role of natural selection in the process of adaptation and introduced the notion of "anthropogeocenosis." Evaluating White's theory, Alekseev acknowledged that "the conception of cultural relativism can now claim the central place in examining and assessing the cultural diversity of mankind both in our time and in its historical evolution" (1993, 105).

Ethnicity is defined as the totality of interrelated mechanisms and modes of human activity handed down from generation to generation, extra-biologically worked out, and aimed at the adaptation to a certain ecological niche, in order to reproduce the ethnic community (Kuzmina 1994c, 50). It is the reduction of food resources that compelled people to change their area of residence or to look for new economic methods of production to ensure their survival.

The ecological approach suggests that we need to reconstruct not only the history of human economic activity but also the dynamics of the environment, including the character and productivity of the soil, landscape, flora, fauna, and climate, any alteration in which leads to a change in the whole ecological system. The challenge is to analyze comprehensively the paleogeographical, paleobotanical, paleozoological, and archaeological data.

The Eurasian Steppe is a unique ecological system. (Maps 2, 3, 4; Figs. 1, 2). From west to east it stretches for 8,500 km, from the Danube to the Great Wall of China. From north to south it extends for 400–600 km, from the forest and forest-steppe zone in the north to the zone of foothills, semidesert, and desert in the south, and between 58° and 47° latitude north of the equator (Mordkovich 1982, 19, 25; Dinnesman 1977). The principal characteristic—and the cause of the formation—of the Steppe landscape is the continentality of climate and the deficiency of moisture (less than 500 mm of annual precipitation), which dictates the vegetation of the Steppe ecosystems. The prevailing vegetation is thus narrow-leaved drought-resistant grasses with well-developed root systems. Annual overdecay of plants leads to the formation of soils rich in humus (up to 700 tons per hectare [t/ha]). The character of vegetation and climate also determines the fauna of the Steppe. Herbivores prevail, with ungulates alongside underground residents like gophers and marmots.

The natural conditions of the Steppe are nevertheless quite diverse (Fig. 3). The Steppe of the Danube Region and the Azov Sea Littoral, with its even surfaces and extremely rich black earth, differs considerably from the semidesert of Ryn-Sands in the Caspian Sea Littoral, from the hillocky area of Central Kazakhstan (Sary-Arka) with its hilly relief, fluvial valleys rich in vegetation, and bare hills, from the Siberian Steppe bordering on the pine forests and taiga on the north and on the Altai and Sayan Mountains in the south, and, finally, from Xinjiang, where the Steppe is side-by-side with oases, severe deserts, and highlands (Mordkovich 1982; M. P. Petrov 1964; 1966; Murzaev 1990).

A distinguishing feature of the steppe zone being moisture deficiency, the southern areas are actually six times drier than the northern ones. The amount of annual precipitation varies from 600 mm in the north to 150 mm in the south. Between 75% and 85% of the moisture evaporates. The rate of evaporation is much higher in the south than in the north, and the total precipitation in the south in winter is half as great as in the north.

Due to the unstable character of the moisture supply, the Steppe ecosystem belongs to an unstable farming zone, in the east continentality being more pronounced than in the west, because of the influence of the Siberian anticyclone. At the same time, while the Steppe vegetation is rich and diverse, it is also essentially heterogeneous. The phytomass reserves are richest in the center of the feather-grass–multiherbaceous part of the Steppe zone, while in the west they reach the maximum figure of 48 t/ha, and at the boundary with the forest-steppe, with its goosefoot vegetation, this figure falls to 28 t/ha. In the wormwood–sheep-fescue Steppe of the southern zone, it drops to 9 t/ha (Mordkovich 1982; Kotova 1994, 771).

Depending on the cyclical fluctuations of the climate and the degree of humidity related to them, the latitudinal bounds and the character of the flora and fauna of the Steppe sometimes changed in the course of the Quaternary period. In the more humid epochs, meadow vegetation became widespread, the processes of humus layer formation intensified, and the Steppe zone shifted considerably southward.

The reconstruction of the Eurasian paleoclimate was worked out in 1910 by Blytt and Serander on the basis of paleobotanical analysis of pollen from Scandinavian peat bogs. They established that, in the course of the Holocene, the post-glacial period of the Quaternary, there were several stages of warming (xerotherm) and cooling, and wet and dry periods. Later this scheme was used as a pattern for other regions of the world (Bruks 1952; Predtechensky 1957; Maksimov 1972; Borisov 1975; Buchinsky 1979; Mokin, Shishkov 1979; Budyko

1970; Budyko, Golitsyn, Izrael' 1986; Poltaraus, Kislov 1986; Veklich 1987; Gerasimov 1993). Climate change could be traced on a global scale. From Western Europe to China, there are correlations of temperature and moisture changes (Lamb 1982; Shaomin Lin 1982; Bradley 1989; Hsü 1998).

The post-glacial period was marked by a gradual rise of temperature, which reached its peak in the fifth to fourth millennia B.C.; along the middle latitudes of Eurasia this resulted in favorable circumstances—humidity rose and the annual temperature was almost three degrees higher than presently. There was a period of gradual cooling that reached its maximum peak around the year 2000 B.C. That was followed by a period of warming, and in the ninth–seventh centuries there was a cooling trend again, with its peak in the ninth century B.C. Events precipitated by this last cooling trend were reported in some Greek and Chinese written sources.

Some of these climatic fluctuations continued to occur throughout Eurasia, but at different rates. The climatic situation in various regions changed, essentially depending on such local factors as air currents, changes in the water table, the formation of lakes and their biological development, or swamping as studied by limnology (Krasheninnikov 1951; Shnitnikov 1957a, b; Dzen-Litovsky 1957; Bogoslovsky 1960; Liss, Berezina 1982), and fluctuations in the levels of the Caspian, Aral, and Black seas (Fedorov 1957; Samsonov 1963; Shnitnikov 1961; Kes' 1969).

Palynological studies and the application of radiocarbon dating methods gave scientists an opportunity to test the Blytt–Sernander scheme, reconstructing the changes in vegetation and climate in the Central Russian Plain (Neishtadt 1957; 1965) and in northern Eurasia (Bruks 1952, Khotinsky 1977; 1980; 1982). The Steppe occupies an intermediate position between the Atlantic-continental zone of the Russian Plain and the continental zone of Siberia. N. A. Khotinsky elaborated a scheme of climatic changes in the Holocene in Eurasia. In the post-glacial period, there was a rise of temperature and humidity. The Boreal period between the years 6900 and 6300 B.C. was characterized by high temperatures accompanied by low precipitation in the Russian Plain and by considerable humidity in Siberia. In the Atlantic period, between the years 4000 and 3000 B.C., and in the Subboreal period, the climate of the Russian Plain was more humid, while in Siberia, on the contrary, a decrease in precipitation occurred.

But the climatic regularities established for northern Eurasia, as mentioned before, cannot be assumed to be the same for the Steppe. Furthermore, the chronological framework is open to dispute. Finally,

correlations between the palynological record and the archaeological strata remain problematic.

A. V. Shnitnikov's perspectives on climate (1957a, b; 1961; 1969), suggesting that cycles of climatic fluctuations lasted about 1,800 years, has been widely accepted in Russian scholarship. However, his scheme rests to a great extent on the studies of the Khorezm Expedition. These correlations between palynology and archaeological strata have since been reevaluated, and therefore this formulation has been questioned (Itina 1977, 32–35).

Unfortunately, we do not have conclusive evidence for the climatic and geographical changes in the Eurasian Steppe and the contiguous territories during the Holocene. There is disagreement not only among various disciplines such as paleobotany, paleozoology, soil science, and limnology—but within each specialty as well.

This state of affairs is exemplified by contradictory conclusions about periods of the expansion of the Caspian Sea (where chronological differences between schemes proposed by N. V. Fedorov and other researchers show discrepancies of as much as two thousand years). The Central Asian climate in the sixth to third millennium B.C., according to G. N. Lisitsyna (1972), shows no changes in the lowland plain of Turkmenistan, whereas the data of S. K. Samsonov (1963), A. V. Vinogradov (1975; 1981), and E. M. Mamedov (Vinogradov, Mamedov 1975) indicate that this was the time of the Lyavlyakan pluvial, when the Kyzyl Kum Desert was a system of bogs and lakes, with bountiful fish species that constituted the basic diet of the Kelteminaric people, who lived in the region between the Caspian and Aral seas.

The actual time period when the modern steppe and desert landscapes of Central Asia came into being is also disputed. According to the data of A. L. Yanshin (1961) and A. A. Kurkov (1969), these landscapes are ancient. Other researchers, however, believe that the development of the present-day arid landscapes date to the Holocene, and, according to a number of authors, specifically to around the year 3000 B.C. (Gerasimov 1937; 1956; Kassin 1947; 1949).

Some researchers believe that the boundary of the Steppe and the forest-steppe in the north, and the boundary of the semideserts in the south were stable (Neishtadt 1965, 198–99), while others assert the opposite (Mil'kov 1953; 1967; Shuvalov 1966; Vasilyukhina 1969; Zubakov 1972; Mordkovich 1982; Volkova, Levina 1982).

The serious disagreements among researchers center around the absolute chronology of the Atlantic and Subboreal epochs and the period when the warming occurred within the Subboreal epoch. Here the discrepancies vary from several centuries to millennia. The data from dif-

ferent disciplines also conflict, especially during the critical period of the late second to early first millennium B.C. The soil scientists, for example, conclude that the climate in northern Kazakhstan "can be reconstructed as dry and more continental. The natural zone boundaries shifted to the north by approximately 250 km, i.e., by one zone" (Khabdulina, Zdanovich 1984, 145, 153), whereas the topographic data from archaeological sites indicate that there was "a stage of warming and moisture" as "a result of more rainfall and a rise in water table" (Potemkina 1985, 25, 28).

Assessment of these disputes is beyond the expertise of archaeology. Therefore multidisciplinary research with paleogeographers and paleobotanists seems promising. The best success in these directions was the research conducted by the Khorezm Expedition (Tolstov 1962; *Nizov'ya Amu-Dar'i* 1960; Itina 1977; Vinogradov 1981; Vinogradov, Mamedov 1975), which convincingly explained the interaction of man and nature from the Copper Age to the Middle Ages. The joint soil and archaeological research of the Institute of Soil Science and Photosynthesis of the Russian Academy of Science, the expedition of Chelyabinsk University (I. V. Ivanov 1983; Khabdulina, Zdanovich 1984), and the investigations of the Samara Institute of the History and Archaeology of the Volga Region (Ivanov, Vasil'ev 1995) are also valuable.

In the present work, the reconstruction of the Steppe paleoecology is based only on the information collected from the archaeological contexts themselves: the topographic location of the sites, the faunal bone materials found in archaeological strata, and correlations between radiometric samples and soil strata. Although at the present time we lack a broad overview summarizing all of these data on Steppe ecology, recently published works, summarizing a large amount of material, including archaeological, are quite useful. These include K. V. Kremenetsky's work (1991) on the ancient history of the Russian Plain, which analyzes the data on the Black Sea North Littoral from the Prut in the west to the Don in the east; E. A. Spiridonova's work (1991) examining the situation in the Don Basin; I. V. Ivanov's and I. V. Vasil'ev's work (1995) analyzing the data of the quite specific region of Ryn-Sands in the Lower Volga Region; Yu. A. Lavrushin's and E. A. Spiridonova's work (1995a, b) on the Ural region; N. A. Khotinsky's works (1977; 1980; 1982) devoted to the Holocene of northern Eurasia and valuable for the reconstruction of the Siberian Steppe paleoecology; and A. V. Vinogradov's and E. D. Mamedov's work (1975) examining the stages of the development of the Kyzyl Kum.

In recent years attempts have been made to correlate paleoecological data with archaeological evidence. Such studies include the research of

N. S. Kotova (1994), Yu. Yu. Rassamakin (1994; 1999), N. L. Morgunova (1995), E. E. Kuzmina (1996–97), and others.

On the whole, this is the current situation. In keeping with N. S. Kotova's data, based on a synthesis of the results of analysis by E. A. Spiridonova and K. V. Kremenetsky, in the western part of the Steppe, from the late sixth to the second quarter, or the mid-fifth millennium B.C., there was a period of aridity, which correlated with the Lower Don Culture. In the third to fourth quarter of the fifth millennium B.C., a moister climatic regime occurred (corresponding to the second period of the Middle Don Culture). The next stage of aridity covers the late fifth to the first quarter of the fourth millennium B.C. and correlates with the Lower Don, Donets, and Late Surski cultures of the Mariupol community. From the second quarter to the end of the fourth millennium B.C., there again was a period of greater moisture. This was the formative epoch of the Tripolye Culture (periods A 4, B 1, 2) and of the sites of the Skelya types and the Sredny Stog and Repino cultures. The decline of the late Tripolye Culture and the beginnings of the Usatovo type sites were demarcated by ecological crisis, the end of the Atlantic period and the transition to the drier Subboreal climate, coinciding with the Hadjibek regression of the Black Sea (Khotinsky 1980). For the eastern range of the Southern Russian Steppe, a fine-grained chronological sequence was worked out by Yu. A. Lavrushin and E. A. Spiridonova (1995a, b), based on palynological profiles cross-dated by radiocarbon dating, found at the Southern Uralian sites and on the flood plain's fluvial deposits.

Around the year 6000 B.C., the Atlantic period began, characterized as the epoch of the climatic maximum and the formation of the present-day landscape zones, which corresponds to the establishment of the Neolithic. Between 4000 B.C. and 3000 B.C., stages of more intensive aridity were recorded, which were also noted for the Caspian Sea North Littoral.

The onset of the Subboreal period is assigned by E. A. Spiridonova to 2500 B.C. The ecological crisis, which covered five centuries, was marked by global cooling and the disappearance of the deciduous forests, which were replaced by coniferous forests. An abrupt change of the ancient vegetation also occurred: the boundary for the grassland Steppe shifted southward to the semi-arid zone of the Caspian Sea North Littoral. Here the accumulation of chernozem and an increase of plant biomass took place. The Repino and Pit-Grave cultures originated in this epoch. Around the year 2000 B.C. there was climatic warming, and, at the same time, increasing aridity, resulting in the expanding desertification not only in the Caspian Sea Littoral but also in the

Don Region. Archaeologically it is the time of the Poltavka Culture. In the period 1800–1600 B.C. there was a cooling trend, an increase in forestation, including pine, birch, lime (linden), and oak, and, also, a growth of the grasslands of the Steppe as well as a rise in their productivity. The Timber-Grave Culture flourished during this period.

In the fifteenth to fourteenth centuries B.C. the climate became warmer, and the Steppe spread, conforming to modern boundaries. In the river valleys, forest vegetation persisted. In the thirteenth century B.C., the onset of a cooling trend and the disappearance of the deciduous species began. The cooling trend reached its peak by the seventh century B.C., when coniferous trees increased in the forest-steppe zone.

The global climatic changes displayed certain peculiarities in the Caspian Sea North Littoral. The results of soil analyses, plus paleozoological, palynological, and paleogeographical studies of the Caspian Sea, show fluctuations (Ivanov, Vasil'ev 1995) indicating that these were particularly strong variations in climatic conditions that had an impact on the ecosystem's productivity.

As a result of these climatic fluctuations, the desert and chernozem-steppe zones shifted in size and boundaries, in some cases by more than 200–500 km from present boundaries between both zones. In the epochs of cooling and increased moisture, which as a rule corresponded to the fluctuations of the Caspian Sea, the multiherbaceous Steppe spread, chernozem soils increased, and conditions became favorable for humankind. During dry and warming periods, on the contrary, deserts appeared, the productivity of the ecological niche fell, brown and semi-desert soil types appeared, and humans abandoned the region. Therefore, as noted by researchers, although the Caspian Sea Littoral developed over time at the same rate and in a similar direction as the Russian Plain on the whole, some archaeological periods are unrepresented.

In the Neolithic and Eneolithic periods, under the humid climatic conditions in the Caspian Sea Littoral, Steppe grasslands existed, allowing humans to populate this region. The advent of the warming period, with its dry, pronouncedly continental climate, leading to the development of the semidesert zone, also coincided with the epoch of the Pit-Grave Culture. Such unfavorable climatic conditions led to the migration of the Pit-Grave Culture population from this region; sites of this period are almost nonexistent.

In the early second millennium B.C. during the Poltavka period, favorable climatic conditions such as a moister regime also resulted in a considerable shift southward of the natural grassland zones. The maximum number of the archaeological sites in the region occurred in this epoch, reflecting the high population density of the Poltavka period.

The epoch that followed, of the Timber-Grave Culture in the Caspian Sea Littoral, is characterized by the advent of warming and another deterioration of the natural conditions, which explains why the Timber-Grave sites are so rare here.

Beginning with the Copper Age and up to the end of the Bronze Age, the range of the Southern Russian cultures included the Caspian Steppe. All the population migrations that returned during the climatically optimal epochs in this region came from the west and the north. Eastward, beyond the Ural River, there was another cultural zone, essentially different from the European one. This regularity of population migrations into optimal climatic zones was noted long ago by A. A. Formozov (1959; 1977) when he studied the Neolithic.

These facts are evidence that the climatic conditions of the Southern Russian Steppe from the Prut to the Urals changed from west to east and at one time period, despite certain disagreements between specialists as to the absolute chronology of the paleoecological events. These discrepancies can be accounted for by the insufficiency of our sources and the variability of the ecosystem itself.

The climatic fluctuations had considerable impact on the living conditions of human communities. The total atmospheric precipitation varied from –50 mm to +350 mm per year, and these changes happened many times during the history of the Steppe. There were also topographical changes from the north to the south of the Steppe, and the biomass of the ecological niche correspondingly (Dzerseevsky 1975; Ivanov, Vasil'ev 1995, 193, 198).

These factors compelled the human population either to migrate to regions with more favorable natural conditions or to change its economic and cultural adaptations through innovation.

Such correlations between climatic conditions and human demography demonstrate the role of ecological factors in cultural evolution, enabling us to study the dynamic interactions between humans and the environment, as well as to discover the reasons for the intensification of cultural contacts, exchange, and the origins of migration patterns along the Silk Road routes.

Chapter 2

Economic Developments in the Ponto-Caspian Steppe

The Lord wished people would not live so cheap,
He taught them to plow and to sow and to reap.
And everyone started to grow his own bread,
And stopped roaming the Steppe and the forests instead.
–Firdausi, Shah-Nameh

The decisive turning point in the history of mankind and its adaptation to natural conditions was the transition from an extractive (foraging and collecting) to a productive economy, called by V. Gordon Childe the Neolithic Revolution. According to most scholars, this transition came about as a result of a combination of interrelated factors, both natural and human-induced: climatic change, population growth, and the extinction of certain species of animals and plants overexploited by man, leading to the reduction of food resources. This food crisis brought about a new food-producing economy that originated in Western Asia, particularly in Anatolia. From this center the early domesticated species of plants and animals spread west and south to outlying geographic areas. These regions of food-producing cultures came to be known as secondary civilizations, such as Southeastern Europe, Transcaucasia and Southern Central Asia, Eastern Iran, and India (Tsalkin 1970a, b; Shnirelman 1980; 1989).

The Southwestern Asian (Near Eastern) origin of domesticated animal species is apparent from the faunal remains of domesticated animals found at the sites that are dated more than a thousand years older than the domesticated animal remains found at sites in other regions of the Old World. Second, it is the Southwestern Asian species that spread into other regions. Last—and most important—according to genetic evidence, the only wild ancestor of the domesticated sheep, from which originated all the varieties of modern species in the Old World, was found only in the foothills of the Zagros (eastern Iran).

Much later the domestication of local animal species took place in the zones of the secondary civilizations, which by then had already adopted livestock herding: in India of the Zebu cattle, and in Central Asia, of the Bactrian camel.[1] (These facts are vital for solving the issue of the domestication of the horse in the Eurasian Steppe.) From the zones of the secondary civilizations the skills of farming and livestock-herding began to spread to other regions of the Old World, including the Eurasian Steppe.

There were several successive stages of economic development in the history of the Steppe economy, distinguished by distinctive styles of interaction between man and environment, the specific character of the cultural complex, and the different directions of the prevailing cultural relations along the future Silk Road routes.

The First Stage of the Food-Producing Economy

The early acquaintance with a food-producing economy in the Ponto-Caspian Steppe is assigned to the Neolithic Epoch. The paleogeographic data, as apparent from site locations and faunal remains of wild animals, indicates that this was a period of mild, humid climate. The earliest evidence for domesticated animals and plants were the discoveries of pig and cattle bones as well as of emmer wheat and barley at sites of the Bug-Dniester Culture, of cattle and pig bones and sickle blades in the Surski-Dnieper Culture, at sites of the Steppe and mountainous Crimea; in the Don Region, in Matveev Kurgan, of pig and sheep or goat bones, and later, in Rakushechny Yar, of cattle bones; finally, the recent finding of cattle and sheep or goat bones in the Caspian Sea North Littoral on the Djangar site (Danilenko 1969; Markevich 1974; Krizhevskaya 1978; 1983; Belanovskaya 1977; *Arkheologiya* 1985; 1987; Yanushevich 1986; Koltsov 1986).

It is important to emphasize that, from its very beginnings, the food-producing economy was *complex*. The earliest food production in the Steppe included both simple farming and the keeping of several domesticated animal species, similar to food production in other regions of the Old World.

What is the nature of early food production in the Steppe? The long-debated issues of a single center of origin or multiple centers of origin of domesticated species, and how domesticated species were introduced into the Steppe, can now be resolved. The appearance of the principal cereals, cattle, and pigs has been traced back to Southeastern Europe, the main center for the origins of early food production in the Steppe. This is apparent from the group of domesticated species found in Neolithic sites of the Steppe and by tracing the earliest con-

tacts with the Steppe cultures, first with the Bug-Dniester Culture, the farmers of the Balkano-Carpathian zone.

I. B. Vasil'ev and A. A. Vybornov (1988, 46–56) argue that the Sura, Mountainous Crimea, Rakushechny Yar, and Djangar sites constitute a single Steppe cultural province. They underscore its central pull toward the European cultures and note its relations with the Caucasus and its fundamental difference from Central Asian and Kazakhstan cultures.[2]

The spread of the food-producing economy in the Steppe was due to the increasing influence of the populations of the Carpatho-Danubian zone; these contacts can be traced in the Bug-Dniester Culture, whose own origins are situated on the Lower Dniester River (Shnirelman 1980, 90; 1989, 175–78). This validates the conclusions of V. I. Tsalkin (1970b, 257, 265). He challenged the view that Eastern Europe was a local center of domestication for certain animal species (I. G. Pidoplichko, S. Bökönyi, and D. A. Krainov). According to V. I. Tsalkin, most ancient domestic animals appeared in Southeastern Europe in the Boian and Linear Band Pottery (Bandkeramik) cultures, peoples who were already familiar with all the principal species—cattle, sheep, goat, pig. Therefore he concluded that their appearance in the Steppe was a result either of migration or cultural borrowing. He also claimed that all these species found in the Steppe as far as Siberia during the Bronze and Iron Ages originated from earlier Neolithic domesticates from Southern Europe.

V. A. Shnirelman (1980, 88–90; 1989, 177) accepted the possibility of a Caucasian center of origin for sheep domesticates; however, this cannot yet be reliably substantiated, since evidence for active contacts between the Steppe population and the Caucasus come in only in later periods (presumably after the Neolithic Period). Nonetheless, he recognized that the origins of food production in the Steppe came from the West.

In contrast, V. N. Danilenko (1969, 178, 181, 193; 1974, 85, 116–18), suggested that during the late fifth to early fourth millennium B.C., in the Caspian-Azov Range, "the development of the Old Pit-Grave Culture took place, resulting in site types similar to Djebel's upper levels and to Pit-Grave portions of the Zaman-Baba burial ground." This indicates a Caspian-Azov Range center of domestication. The Caspian Sea Littoral's increasing aridity and the human overpopulation of the region caused the Kelteminar and Pit-Grave cultures to migrate westward, taking to Europe sheep or goats and the Indo-European words for them. He also claimed that cattle were brought to Europe from the Trans-Don East, where both Indo-Europeans and Turko-Altaians had domesticated breeds of cattle.

This notion of a Central Asian origin for sheep domestication and

the early formation of the Pit-Grave Culture in the East, with clear evidence for a Central Asian component, is well worth dwelling on, for it influenced many scholars, including N. Ya. Merpert (1974, 143–44) and N. L. Morgunova (1984, 19; 1995, 73, 86–89, 93); the latter, however, assumes the late arrival of the Pit-Grave Culture people to the Urals from the West (Morgunova, Kravtsov 1994, 110).

V. N. Danilenko's hypothesis has already been subjected to sharp criticism (Tsalkin 1972a; Formozov 1972, 23, 31, 34; Kuzmina 1981; Shnirelman 1989, 177). The premises of his hypothesis are groundless, for the following six reasons.

1. The range of the Kelteminar Culture did not include the Caspian Northern Littoral (A. V. Vinogradov 1981, 164). Moreover, A. A. Formozov (1959, 155) had already proven the existence of the border along the Emba River between the two Neolithic zones, European and Asian, noting their specific characteristics. This conclusion was validated later in his study of the Caspian Sea North Littoral's numerous sites, including the stratified ones. "There are major distinctions between the Neolithic cultures of the Caspian Sea Littoral and the Aral Sea Littoral," "the differences between the two cultures' evolutionary stages can be traced," and one should "speak not only of the cultural difference between these regions but also of their belonging to different cultural provinces," and assign the Caspian ones to the Western Caspio-Pontic circle (Ivanov, Vasil'ev 1995, 121).

2. The increased aridity of the Caspian Sea Littoral never took place during the Neolithic Period. This period was known for the increased moisture of the Central Asian climate—"the Lyavlyakan pluvial" (Vinogradov, Mamedov 1975, 234–55). The ecology allowed for the dominance of fishing in the numerous lakes (Vinogradov et al. 1986).

3. Djebel's materials must be treated with maximum caution. Of the site's eight levels, only the third, where imported pottery of the Shahtepe III-II and Kyzyl-Arvat type (the turn of the third–second millennium B.C.) was found (Okladnikov 1956, 201–5), can be dated reliably. Notably, however, the local coarse-ware pottery of the Upper I–III Bronze Age levels is analogous with the previous IV and V levels assigned to the Neolithic, which casts serious doubt on stratigraphic levels at this site.

In all the levels, *dzeren* (a type of gazelle) and sheep/goat bones[3] were found, and in the III level, bones of the bull (aurochs), which was acknowledged as wild by V. I. Tsalkin (1956, 220–21), who, noting that, without sufficient context, "it is extremely difficult to judge whether sheep/goat bones belong to the wild or domestic species," thought that sheep or goat bones from the III and IV levels possibly belonged to domestic individuals. Djebel's stratigraphy aroused discussion because

the ash archaeological levels could have been disturbed (Formozov 1972, 26). Therefore, Djebel cannot be the basis for broad general historical reconstructions.

Domesticated sheep/goat bones were discovered by V. I. Tsalkin (1970b) in the Dam-dam Chashme Cave in Transcaspia (Markov 1966): in level N 6, 5 bones; N 5, 1; N 4, 56; N 3, 189 bones. In the upper level N 2, imported pottery of the Shah-tepe II type was found, which dates the level to the third millennium B.C. V. A. Shnirelman (1980, 74–75) considers as domesticated only the sheep bones from levels III and IV, while G. F. Korobkova believes that materials from this level are comparable to materials from the South. V. A. Shnirelman's conclusion rules out the appearance of domestic sheep in Transcaspia at a very early date, i.e., the Neolithic.

The assumption of A. P. Okladnikov and V. N. Danilenko, still shared by many authors, is based upon the uncritical understanding of C. Coon's work (1951), which acknowledged the Caspian Sea South Littoral as the center of sheep and goat domestication. However, the scanty materials of the Belt Cave came under severe criticism from scholars (Narr 1975, 421–22; Shnirelman 1980, 71–72), since, according to DNA chromosomal data, all the domestic sheep species derive from a Western Asian progenitor.

Credible traces of the early food production economy in Central Asia have been established only for the agricultural Jeitun Culture in Southern Turkmenistan. The Jeitun Culture had its earlier roots in Western Asia and has evidence of domestic sheep, goats and cows, grains of two-rowed barley, and soft and dwarf wheat. These domesticated species were all of Near Eastern origin (Tsalkin 1970b, 123–26, 148; Masson 1971, 79; Shnirelman 1980, 73; Korobkova 1981, 13).

Other sites from the Neolithic and early Eneolithic period in Central Asia do not show any traces of a food-producing economy, although more than 800 Kelteminar sites already have been examined in the Aral Sea Littoral (A. V. Vinogradov 1981; A. V. Vinogradov et al. 1986). Due to specific ecological conditions, the local economy was based on fishing. This was also typical of the Bukharan oasis sites (Gulyamov et al. 1966, 87–90).

Only the discovery of camel bones and a spindle whorl in the late Neolithic burial ground of Tumek-Kichidjik alludes indirectly to the possibility of the origins of livestock herding here (A. V. Vinogradov et al. 1986). Assumptions about the pastoral character of the economy of Tajikistan's mountain tribes of the Hissar Culture also have been disproved (Ranov 1998, 113).

4. In the Steppe zone of Central Asia, the most ancient sites associated with the food-producing economy are the Zaman-Baba burial ground and settlement (Kuzmina 1958; Gulyamov et al. 1966, 118–86) (Fig. 36). Impressions of wheat and barley grains, as well as querns and sickle inserts, were found here. From the osteological materials, 15% of the bones belong to deer, wild boar, and dzeren, indicating a hunting economy, and 85% of the bones come from domesticated cow, sheep, goat, and donkey. Animal bones are present also in the graves. But this grave and settlement complex is not representative of the origins of the Pit-Grave Culture, if for no other reason than its chronological placement. A. Askarov (1981) and V. I. Sarianidi (1979) assigned it to the latter half and even to the late second millennium B.C. and related the Zaman–Baba Culture to the Bactria–Margiana complex, a chronological placement we no longer accept. The settlement and the burial ground have now been placed at the third–second millennium B.C. on the basis of the southern imports, analogous to materials from Namazga V, Shah-tepe II, Hissar III B, and Mundigak IV (Kuzmina 1958, 33; 1968, 306). This date for the burial ground was recognized by V. M. Masson (1966). Our chronology is built upon the traditional chronology for the Namazga Culture. However, even if we accept the calibrated dates used by Western scholars, Zaman–Baba's dating is later than the calibrated dates for the Pit-Grave Culture (Rassamakin 1999).

5. V. N. Danilenko's linguistic reasoning contradicts that of modern linguistics (Kuzmina 1981, 38).

6. His idea (1974, 25) that it was the purely pastoral nomadic economy that originally established itself in the Steppe is invalid also. On the contrary, at the early stages the complex food-production economy was present throughout the Old World (Shnirelman 1980, 94; Rassamakin 1999, 73).

In the southern Russian Steppe, the appearance of domesticated species of plants and animals resulted from contacts with the mixed farming populations of the Carpatho-Danubian zone, which, according to C. Renfrew's model (1987; 1992), were influenced by exchange networks that resulted in the diffusion and spread of farming communities (Shnirelman 1980, 92; 1989, 179).

The Second Stage of the Food-Producing Economy

The second stage in the development of the food-producing economy originates at the beginning of the Copper Age. Here, ecology has a decisive influence on the character of economic activity.

In the zone extending from the Dnieper to the Urals, the absence of bison bones and the decrease in auroch bones in the faunal materials at sites indicate that intensive hunting probably led to the reduction of

the numbers of ungulates. I. V. Ivanov and I. B. Vasil'ev (1995, 200) point out that, along the Caspian Sea Littoral in the Eneolithic period, the main food was wild animal meat, and the major hunted species was the *dziggetai* (the onager),[4] with 10% of the total killed. On the one hand, overexploitation of ungulates caused an economic crisis, but, on the other hand, it opened ecological niches for domesticated species. Thus the crisis was brought about by the intensification of the food-producing economy.

In the zone from the Dnieper to the Urals during the latter half to the late fifth millennium B.C., a number of cultures formed that constituted the Mariupol Community: the Azov–Dnieper Culture (according to V. N. Danilenko 1974), or the Nadporozhye–Azov variant of the Dnieper–Donets Culture (according to D. Ya. Telegin 1965; 1991; *Arkheologiya* 1985; 1987; Kotova 1994), the Nizhny Don (the Lower Don), Samara and Caspian cultures (Vasil'ev 1980a, b; Vasil'ev, Matveeva 1986; Sinyuk 1980; Melent'ev 1970; 1976; *Eneolit* 1980; Kotova 1994).

N. S. Kotova (1994, 58) advances a more refined chronology of these cultures. She dates the Mariupol sites to the late Neolithic and the early Copper Age, including also the second stratigraphic levels of the Razdorskoye settlement and the fourth and fifth stratigraphic levels of Rakushechny Yar. She assigns these levels to the Nizhny Don Culture, thus correlating them with the Bug–Dniester Culture, which dates from the third quarter of the fifth millennium B.C. She also includes the Nizhny ("Lower") Don Culture in the Mariupol Community and assigns the second period of the Azov–Dnieper Culture to the early Copper Age, noting its relations with the Sredny Stog population.

The Mariupol Community sites were succeeded by the cultures of Sredny Stog in the Pontic Steppe and Khvalynsk in the Volga Region, which formed a single community (Telegin 1973; Vasil'ev 1980a, b; Agapov et al. 1990).[5]

At the present time, researchers studying the Ukraine, instead of singling out Sredny Stog Culture (whose classical type-site is the settlement of Dereivka), point to the existence of four independent cultures, each representing different, overlapping chronological periods and geographical axes and constituting the Sredny Stog Province: Skelya, Stog, Kvitya, and Dereivka (Rassamakin 1994, 32–45; *Arkheologiya* 1987; Kotova 1994, 75–83). Skelya, the most ancient Eneolithic culture of the Ukraine, is contemporaneous with the cultures of Gumelnitsa A II–B I, Varna, Cucuteni A, and Tripolye B I–B II, with which it maintained active relations. Based upon these contacts, the culture dates to 4500–3600 B.C. (Movsha 1984). The Kvitya Culture, which spread over the broad territory from the Danube to the Don, is synchronized with the Tripolye C II stage (3600–3000). Finally, the Dereivka Culture expanded into the forest-steppe zone and, judging from the findings of imported artifacts, is contemporaneous with the Tripolye B II–C I and Chernavoda (in Romania) stages, which suggests a chronological placement of 3700–3150 B.C.

According to Yu. Yu. Rassamakin (1994, 42), only the early Skelya Culture of the Sredny Stog province is contemporaneous with the Khvalynsk Culture of the Volga Region.

Many categories of archaeological materials present evidence for the expansion of contacts between the Mariupol and Sredny Stog tribes with the farmers of the Danube Region and the Dnieper Region, whose cultures are known by the Linear Band Pottery. From these centers came the spread of the food-producing economy into the Steppe (Shnirelman 1989, 168).

The Mariupol Community tribes raised cattle, sheep or goat, pig, and horse. Domesticated animal bones amount to over 50% of the osteological materials, which indicates that livestock herding was an important component of the Mariupol economy.

The Domestication and Early Use of the Horse

An important innovation of this period was the domestication of the horse. According to V. I. Gromova (1949), the earliest horse domestication took place in the area between the Dnieper and the Urals—in the natural range of the *tarpan* (the probable ancestor of the horse).[6] This hypothesis was corroborated in the 1970s by all of the prominent paleozoologists (Bibikova 1967; 1969; 1970; Tsalkin 1970b; Bökönyi 1959; Necrasov 1971) and received general recognition (Kuzmina 1977a).[7]

The taming of the horse probably was carried out by a population already familiar with livestock herding. The advocates of the single-center hypothesis of the origins of livestock herding showed that in all the regions of the Old World the local animal species were domesticated after the population had already adopted domesticated herd animals, borrowed from Western Asia (Shnirelman 1989).

Bones of the most ancient horses were found at the sites of the Dnieper-Donets and Samara cultures. Later the number of horses in a herd increased, reaching 60% in Dereivka and 80% in Repin Khutor of the total domesticated animals. The most ancient evidence of the formation of the horse cult was also recorded—so important for the mythology of Old World peoples, notably among those who spoke Indo-European languages.

From the Steppe tribes the horse was borrowed by the farmers of southeastern Europe: domesticated horse bones were found at the settlements of the Linear Pottery, Körös, Boian, Gumelnitsa, Cucuteni,

and Tripolye cultures. Among these, however, they account for only a small part of the osteological materials, which points to the insignificant role of horse breeding in these cultures (Bibikova 1969; Tsalkin 1970b, 183, 184, 196; Bökönyi 1959; Necrasov 1971).

The questions of the time and centers for the domestication of the horse and its original use, which seemed resolved in the 1960s by V. I. Tsalkin and V. I. Bibikova, have recently been reconsidered. At the colloquium "The Indo-Germans and the Horse" in Berlin in 1992, J. Mallory (1981) noted that he knew of no ritual burials of horses from the Urals to the Caspian Sea in the pre–Pit-Grave period, while M. A. Levine (1990; Levine, Rassamakin 1996; Rassamakin 2002) and H.-P. Uerpmann (1990) questioned the reliability of the signs of the domestication of the horses from Dereivka. A. Häusler (1992; 1994) acknowledged the complex of Dereivka to be a trash pit, declared the horse's skull with its signs of domestication to be unrelated to the Sredny Stog level, and refused to recognize the scepters as representing horses.

A quantity of new materials from the Steppe allows archaeologists to revisit the question of horse domestication. It seems methodologically correct to acknowledge three necessary conditions for horse domestication: (1) presence of the wild ancestor of the horse; (2) knowledge of livestock herding; and (3) the necessity for resources from the horse that might stimulate the process of domestication. Only the presence of all three of these preconditions together is necessary and sufficient as evidence of the domestication of the horse. In the Steppe all three pre-conditions were in place: (1) the need for a meat supply came about because of the extermination of large numbers of ungulates in the Copper Age; (2) the population had maintained domesticated cattle, sheep, and goats since the Copper Age; and finally, (3) wild horses were found there.

Whether the horses found there belong to the wild or domesticated type must be decided by paleozoologists. As is well known, the markers for domestication of the horse, in contrast with cattle and sheep or goat, are slight and often indeterminate. However, a number of leading paleozoologists support V. I. Bibikova and V. I. Tsalkin's opinion that the Southern Russian Steppe was indeed the center of the domestication of the horse (Benecke 1993b; Bökönyi 1994; Benecke and Driesch 2003; Boessneck and Driesch 1975; 1976).

Opponents focus their case upon the horse remains from Dereivka, which, owing to work by D. Ya. Telegin and D. Anthony, became world-famous. More recent radiocarbon analysis, in actual fact, suggests the remains come from a later period (as subsequently reported by Anthony). However, domesticated horse bones have been found at late

Neolithic and, particularly, Copper Age, sites from the Dnieper to the Urals.

Yu. Yu. Rassamakin (1994) rightly expresses doubt as to the determination of horse bones at the sites, because the selection is unrepresentative and the complexes are mixed. But horse bones, apart from these sites and Dereivka, are also present at the settlements of Molyukhov Bugor and Alexandria of the Sredny Stog Culture (or province) and the amount is about 50% of the total animal bones (*Arkheologiya* 1985, 309; *Arkheologiya* 1987).

At the Vilovatovskaya site in the Samara Region (Vasil'ev et al. 1980, 151ff.) in the mixed Neolithic and Eneolithic levels, the bones of domesticated animals amount to 46.15% of all found, 40% are horse, 33.3% are sheep, and 23.3% are cattle. A. G. Petrenko, who studied the collection, considers the horse remains to be domesticated. At the late Neolithic Varfolomeyevka site of the Orlovo type in the Volga–Uralian interfluve, bones of domesticated cattle, sheep, dog, and horse were found and determined by A. Yu. Fomichev to be both domesticated and wild (Yudin 1988, 164). The horse remains account for about half of all the bones. On the Ivanovka site in the Orenburg Region (Morgunova 1995), in the Neolithic level, domesticated species account for 52.4% of the bones, of which 45.5% belong to horses, 27.3% to sheep, and 2.7% to cattle. In the Eneolithic level, out of the 45.7% that are domestic animal bones, 53.75% are horse, 25% are sheep, 16.25% are cattle, and 3.75% are dog. According to A. G. Petrenko, the horse remains represent domesticated species.

The domesticated horse is also represented in more northern areas of the Ural region. In the Neolithic level of the Mullino site, among the 26% that are domesticated animal bones, the major part—17.64%—belong to the horse, and only 4.4% each to sheep and cattle. In Davlekanovo, 67.5% of bones belong to the domesticated species, the horse considerably prevailing (44.1%), the cattle accounting for 17.3%, and the sheep, 5.6% (Petrenko 1982, 301–7). The same holds true for the Eneolithic level: according to A. G. Petrenko (1982, 303), in Davlekanovo, domestic animal bones amount to 52.8%, among which the horse accounts for 37.7%, the cattle, 14%, and the sheep, only 0.89%. (In Mullino, the numbers are smaller: 35%, 13%, 15%, and 6.5%, respectively.)

In Transuralia, among the sites of the Surtandy Culture, at the Murat location bones of domestic animals amount to 93% of the total, of which 66.6% is from horses (Matyushin 1982, 82, determinations by A. G. Petrenko).

Thus, from the Dnieper to the Urals stretches a zone of cultures in

which horse bones are quite representative, alongside the borrowed species of cattle and sheep. Such data may be used to determine whether these horses are wild or domesticated.

Unfortunately, the majority of those participating now in the discussion of the domestication of the horse are not professional paleozoologists and offer only general considerations and indirect data on the sites' stratigraphy, the attrition of the teeth, and the age of the slaughtered animals, etc.

Among the most prominent paleozoologists acknowledging the Ponto-Caspian Steppe as the center of the domestication of the horse are S. Bökönyi (1994), N. Benecke, and A. von den Driesch (2003), R. Meadow (1996), and N. Benecke (1993a, b).[8] The last examined bone remains of European horses, identified several centers of the spread of the horse in ancient times, and came to the conclusion that the early domesticated horses in Europe originated from the East European Steppe species, which were the oldest.

As reported by A. von den Driesch,[9] in the initial period of domestication the male leaders of the horse herd would be castrated, as a means of taming them. I am not aware whether the osteological collections from the Southern Russian Steppe have been examined from this angle. However, there is one very important argument, provided by data from the origins of the horse cult in the Southern Russian Steppe. It has already been established by Behrens that an animal important in the economy becomes a cult object (Fig. 4). The most ancient ritual burial of a horse's skull and legs was discovered in the Volga Region in the Syezzheye burial ground of the Samara Culture of the first half of the fourth millennium B.C. On the sacrificial ground lay two horse's skulls and leg bones sprinkled with ocher; according to A. G. Petrenko, they belonged to the domesticated species. Next to these were figurines, made of a wild boar's tusk, of two cattle and two horses (Vasil'ev, Matveeva 1979, 159, fig. 3; Vasil'ev 1981, 67, fig. 7: 1–4).

At the late Neolithic Varfolomeyevka site of the Orlovo Culture in the Saratov Transvolga Region, where bones of domestic animals—cattle, sheep, horse, and dog—were discovered, three bone horse figures with orifices for suspension were found (Fig. 4: 1). On the head of one horse was an indication of a bridle (Kileinikov, Yudin 1993, 81, fig. 11.3–5). At the same location, ornamented horse fetter bones were found, to which analogies are known in Rakushechny Yar, the Vilovatovskaya site, and Botai (V. F. Zaibert 1993, 177, fig. 21). A stone staff with a horse's head was also found (Yudin 1988, 162, fig. 11).

In a burial in the Eneolithic burial ground of Lipovy Ovrag of the Samara Culture, a figure of a horse, made of bone, was discovered; another was found at the Vilovatovskaya site, which also contained

bones of horses, cattle, and sheep or goats (Vasil'ev, Matveeva 1986, fig. p. 37, 39; Vasil'ev et al. 1980, 184, fig. 21: 2) (Fig. 4: 2–6).

The same cult practice as in Syezzheye was preserved in the Volga Region in the mid- to latter half of the fourth millennium B.C., among the population of the Khvalynsk Culture. At the Khvalynsk Eneolithic burial ground, interments are accompanied by skulls and leg bones of cattle and sheep or goats, and in seven cases by the leg bones of horses. On the sacrificial grounds, there were skulls and legs of cattle and sheep or goats, a skeleton of a lamb, and, on three sacrificial altars, the leg bones of horses (Vasil'ev 1981, 69; Agapov et al. 1990, 8, 59, 60, pl. 7).

The burial of horses' skulls and legs, laid together with the hide in keeping with the *pars pro toto* principle, are well known in the ritual practice of the peoples of the Old World, earliest among them the Indo-European populations (V. V. Ivanov 1974; Kuzmina 1963b; 1977a; Piggott 1962; Raulwing 2000; Mair 2007).

Another piece of evidence for the development of the horse cult is the so-called scepters that have zoomorphic representations, including horses' heads (Merpert 1974; Danilenko, Shmaglii 1972; Popov, Smirnov 1973; Vasil'ev 1981, 25; Agapov et al. 1990, 87; Gimbutas 1970) (Fig. 4: 7–10). A new discovery of a scepter with a horse's head was made recently in the Novoorsk district (Morgunova 1995, fig. 76: 2). Included in this grouping of artifacts is a stone staff with a horse's head, found at the Varfolomeyevka site (Yudin 1988, 162, 163, fig. 11), the same site where horse bones and representations of horses carved in bone were found. It is also interesting that a stone pestle was discovered in the Caspian Sea North Littoral in the Ak-Zhunas burial ground (contemporaneous with the one at Khvalynsk) (Dubyagin et al. 1982, 103, 105, fig. 1). It features a horse's head with a clearly depicted bridle ornamented with cheek pieces.

A. Häusler questioned the variety of the depicted animals. Indeed, a number of specimens, particularly in the West, are quite conventionalized. However, on many scepters the horse is represented realistically. It is the scepter-hammer from the Orenburg Region and the scepter from Suvorovskaya, on which a bridle is marked, that primarily dispel all doubts.

The summary of the data and the typological classification of the zoomorphic scepters were put forward by V. A. Dergachev and V. Ya. Sorokin (1986, 54–65), who demonstrated that development in the Steppe went from realistic examples to conventionalized ones, and that their spread into early cultures reflected the Steppe influence in the Carpatho-Danubian Region. Thus, the new data corroborate the hypothesis that the origins of horse breeding took place in the Steppe zone from the Dnieper to the Urals, and that it was precisely here that,

by the fourth millennium B.C., the horse cult—one of the most important rituals of Eurasia—originated.

Much more complicated is whether an independent center of the domestication of the horse originated in Northern Kazakhstan. Here at the Neolithic Botai settlement, a huge number of horse bones was found, constituting 99% of the fauna (V. F. Zaibert 1993). Hunting was a staple of the economy, with no traces of a food-producing economy typical of the cultures of the Old World. On the other hand, there are numerous pits with bones attesting to the mass slaughtering of animals.

The variety of the Botai horses has resulted in much discussion. I. E. Kuzmina (1995) acknowledged them as domesticated and proposed that the skull of the Botai horse resembled the broad-toed Uralian horse. At the same time, the prominent specialist in animal domestication, N. M. Ermolova, did not find any signs of domestication in the portion of the collection that she examined. Among other scholars, opinions also differ. D. Anthony and D. Brown (1991, 2000) consider the Botai horses to be domesticated, based on the analysis of the horses' teeth, on the basis of bit wear on the teeth (Anthony, Brown 2000). M. Levine (1990, 1999), who disagrees with Brown and Anthony, argues that the horses were wild, based on demographic reconstructions of the ages at which the horses were slaughtered (Levine 1990; Levine, Rassamakin 1996).

The location of Botai, on a high promontory separated by a pine forest from a narrow hollow, would have been an ideal place for seasonal horse hunting. Until a final objective evaluation of horse domestication is put forth by paleozoologists, the most balanced view is V. F. Zaibert's tentative opinion (1993) that Botai could have been a place of seasonal hunting, and that the familiarity of its inhabitants with horse husbandry led to the first attempts at taming a few horses for riding as a means for driving the herd into a trap. (This method is employed nowadays in Siberia by reindeer hunters.) For this, the rider needed no bridle. Numerous pits filled with the horse bones at Botai point to the fact that the horse was a main source of food.

The initial use of horses in the Southern Russian Steppe also has been debated. Some archaeologists argue that livestock herding developed independently of farming and was a mobile economy from the very beginning. V. N. Danilenko and N. N. Shmaglii (1972) advanced a hypothesis, supported by M. Gimbutas (1970), for the emergence in the earliest period of rider-warriors, a major turning point in the history of Eurasia. Allegedly, these equestrian squads would carry out military interventions in the Danubian Region and the Carpathian Mountains, destroying, by fire and sword, the agricultural settlements. This hypothesis was further developed by J. Lichardus (1984; 1991).

The similarities between the funeral rites of the Sredny Stog Culture and the Varna burial ground, which contains very rich burials with gold, attesting to social differentiation, are used to support the hypothesis of an invasion from the Black Sea Littoral by equestrian nomads.

Is the hypothesis that nomadism and the military use of horses originated in the Steppe in the fourth millennium B.C. justifiable given the available evidence?

Undoubtedly, for the shepherds of the Copper Age to control the herd, they probably knew how to ride on horseback. A strap or a cord halter would suffice for these early horseback riders. But the rider who must shoot and fight with a spear requires a means of controlling the horse, presumably a bridle consisting of a bit and cheek-pieces.

D. Ya. Telegin (1973) identified as the earliest extant cheek-pieces those fashioned of bone with one or two orifices at Dereivka. On the basis of these early cheek-pieces, the hypothesis for the early spread of horseback riding in the Eurasian Steppe, also acknowledged by J. Mallory (1989), D. Anthony (Anthony 1995; Anthony and Brown 2000), and others, had been put forth.

In actual fact, this hypothesis is based upon a misunderstanding. In 1970, P. M. Kozhin published an article in which he assumed that the horn articles with holes found at the sites of the Afanasievo Culture in Siberia remotely resembled the cheek-pieces of the Scythian period, and therefore these Afanasievo cheek-pieces indicated the existence of horseback riding. This assumption was rejected by M. P. Gryaznov, causing Kozhin to retract the hypothesis. Nevertheless, V. N. Danilenko and N. N. Shmaglii (1972), and D. Ya. Telegin (1973) identified similar articles from Dereivka as cheek-pieces, thus declaring the horse pastoralists of the Steppe to be nomadic riders, who conducted distant military raids.

M. Gimbutas (1977), who, according to A. Häusler's inquiries (1996), studied in Germany in Heidelberg under prominent supporters of Pan-Germanism, furthered this hypothesis in a political manner. Gimbutas believed that the savage warrior-riders, coming from the east, destroyed the farming culture of Europe by fire and sword.

This is not the first time I have had to challenge this hypothesis (Kuzmina 1983). Recently a study was conducted on a group of European artifacts that are widely distributed across different cultures (Dietz 1992). According to the ethnographic and archaeological data, the analyzed artifacts have a wide distribution ranging from the horn hoes of Tripolye (Rassamakin 1999) to unfastening devices in China

(Komissarov 1980). These artifacts were multifunctional and present in cultures with different economies, including those without horses. The artifacts were particularly numerous at the pile settlements of Switzerland, where they were used for netting (Dietz 1992).

Thus, the proposal that horseback riding originated in the Steppe has no solid support. This by no means rules out the possibility that the shepherd–horse-pastoralists did ride on horseback to manage the herd, controlling their riding horses with a strap or a cord halter. But fighting on horseback—shooting with a bow and thrusting a spear—without the help of the bit and cheek-pieces was impossible.

So how was the horse used at the early stage of its domestication?

S. Bökönyi (1994) identified the stages of early livestock husbandry. At the earliest stage of domestication, humans who had made the transition from hunting to food-producing would simply have eaten the recently tamed animal, much as they had its wild ancestor, using it as "live food on the hoof." Only at the second stage of domestication did people use the animals' milk and wool (secondary products) and employ these animals for traction.

At the Eneolithic sites of the Southern Russian Steppe, horse bones are split, indicating that the horse was used as a meat animal and that under no condition was the horse used for distant migrations.

The Development of the Pit-Grave Cultural Community

The third stage, early third to second millennium B.C., was the height of the Copper Age. According to palynological analyses of the archeological levels at the sites, around the year 3000 B.C. the pluvial period gave way to the drier Subboreal one. The Pontic Steppe lost its deciduous forests; the border between the forest and the Steppe roughly corresponding to the present boundary was established; in Kyzyl Kum, the Lyavlyakan pluvial period came to an end; in Kazakhstan, semidesert and steppe biomes conformed to their modern-day distribution; and, possibly, the transgression of the Caspian Sea occurred (Gerasimov 1937; 1956; 1993; Buchinsky 1979; Neishtadt 1957; 1965, 199, map; Vinogradov, Mamedov 1975, 252; Kassin 1947; *Kolebaniya uvlazhnennosti Aralo-Kaspiiskogo regiona v golotsene* 1980; Khotinsky 1982; Ivanov, Vasil'ev 1995; Kremenetsky 1991; Spiridonova 1991; Lavrushin, Spiridonova 1995a, b).

The third millennium B.C. represents the peak of the Pit-Grave Cultural Community, related to the preceding Eneolithic cultures (Fig. 5). The large quantity of Pit-Grave tombs in the burial mounds throughout the region is evidence for a considerable rise in the population, as a result of the success of the food-producing economy in the previous period.

However, in the third millennium B.C., the productivity potential of their ecological niche was lessened as a result of the increased demographic pressure of these communities, climatic changes, and the changing nature of the Steppe landscape. The intensification of food production became impossible because the Steppe soil and climatic conditions were insufficient for early farming. The crop yield in Mesopotamia, given irrigation, amounted approximately to 600 kg/ha (sam-30),[10] and sometimes rose to 1500 kg/ha, and even, according to Herodotus (I. 193), would reach sam-200 and sam-300. In Greece it was 800–1000 kg/ha; in the Balkans, 400 kg/ha; in Central Europe, 200 kg/ha; while in the Steppe, it was only 80–300 kg/ha (Vaiman 1961, 3–5; Kuzmina 1968, 176, 177; Shnirelman 1989, 186).

As already mentioned, the climate of the Steppe has an unpredictable rate of precipitation, often small, rendering it an unstable farming zone. Precipitation decreases from the northern border to the south from 430 mm to 150 mm per year, and the humidity factor due to evaporation decreases sixfold (Mordkovich 1982, 26, 98, 99).

The productivity of the Steppe soils is diverse as well (Map 5). Over 2.5 million ha are chernozems. According to nineteenth-century Ukrainian data, they yielded 50 poods (equivalent approximately to 36 avoirdupois pounds) of wheat from each desyatina (equivalent to 2.7 acres) (Bibikov 1965, 53). At the same time, in some regions, particularly in the East, soils of low fertility prevailed, with some altogether infertile, such as brown and gray earths and sands. In Western Kazakhstan the former amounts to some 40%, the latter to 10–30% of land. In the Orenburg Region fertile chestnut soils give way to saline soils (Uspanov 1949). Accordingly, in 1909 in the Aktyubinsk *uyezd* (i.e., district), the wheat crop was sam-10, and the millet sam-4 (*Spravochnaya knizhka i adres-kalendar' Turgaiskoi oblasti* 1911, figure). Naturally, in the Copper Age the crop yield was even lower.

Thus, given primitive tools and simple agricultural technologies, farming in some areas of the Steppe was close to impossible and in other areas was much less effective than in Western Asia and Southeastern Europe.

At the same time, the Eurasian Steppe, a natural pasture covered mostly by the very rich feather-grass–multiherbaceous vegetation, and also wormwood–sheep's-fescue grasses, provided optimal conditions for livestock herding. The feather-grass–multiherbaceous steppe can produce 15 kg/ha (kilogram per hectare) of hay, the wormwood–sheep's-fescue, 7 kg/ha, and the semidesert plots, 5 kg/ha. One square kilometer can feed six to seven head of cattle and horses annually.

These conditions were ideal for a food-producing economy in which livestock herding prevailed. Moreover, such conditions predicted the specific character of the economic adaptations that occurred in different regions.

As early as the 1960s, archaeologists demonstrated that the development of a food-producing economy in the Steppe was uneven. In the Ukraine, a mixed economy prevailed, and farming still played an important role, as is apparent from agricultural tools found at sites and the large quantity of settlements (Durna Skelya, Skelya Kamenolomnya, etc.), including large multicomponent ones (Mikhailovka). In the Volga-Ural region, settlements are practically unknown, indicative of a different economic type (Merpert 1968, 41; 1974, 109–13; Shaposhnikova 1985; *Istoriya* 1997).

Judging by the osteological materials, hunting and fishing lost their significance for the Pit-Grave peoples; instead, these groups bred cattle, sheep, and horses. At the Ukrainian settlements, the bone distribution of cattle was 45%, sheep or goat over 30%, horse around 18%. In the upper level of Mikhailovka it was 60%, 30%, and 10% respectively for the bones, and 46%, 34%, and 18% for the individuals (Tsalkin 1970b, 247, pl. 51; Merpert 1974, 116–17; Shaposhnikova 1985, 350). Due to the lack of data from the Volgo-Uralian settlements, it is impossible to determine the percentages of animal bones at the sites; the ritual burials of animals found in the burial mounds suggest an identical species composition.

The specifics of livestock husbandry in the eastern regions is best understood by examining the locations of these sites. V. P. Shilov (1975) has established that some burial grounds (Kuzin Khutor, Balkin Khutor, Tsatsa) are situated away from river watersheds (Shilov 1970; 1975, 37–39). This is unquestionable proof for the presence of a specialized economy dominated by livestock husbandry and also by mobile pastoralism.

The Spread of Wheeled Transport: A Prerequisite for the Opening of the Great Silk Road Routes

The important innovation of Pit-Grave peoples of this period was that of wheeled transport (Fig. 8). The question of the origins of wheeled transport requires an analysis of the history of transportation in the Old World. The appearance of wheeled transport in the Steppe dates from the latter half of the third millennium B.C. and is documented by discoveries of wheels, fragments of vehicles, models of vehicles, and pairs of draft cattle at the burial grounds of the Novosvobodnaya and Novotitorovka cultures in the Kuban Region and of the Pit-Grave Community from the Dniester to the Urals (Childe 1951; Piggott 1969; 1983; Kuzmina 1974a; 1980b; 1983; Häusler 1981; Azzaroli 1985; *Achse* 1986; Izbitser 1993; and others).

The invention of the wheel is one of the most important discoveries in the history of humankind. For five millennia it has largely determined the evolution of our civilization. The use of wheeled transport considerably increased labor productivity both in farming, where it provided for the delivery of crops from the field, and in livestock herding, where it allowed the herdsmen to follow their cattle in pursuit of new pastures, which resulted in the emergence of nomadic pastoralism. But first and foremost, it furthered the unprecedented expansion of exchange, which in turn promoted cultural contacts between remote regions and accelerated the diffusion of ideas, and consequently led to great historical change. Therefore, studying the evolution of wheeled transport is of considerable scientific interest.

According to most researchers subscribing to Childe's single-center hypothesis (Childe 1951; 1954) for food production, wheeled transport was invented in the late fourth millennium B.C. in Western Asia and in the course of the third millennium B.C. spread from there to the areas of the second-order civilizations: to the Caucasus, to Northwest Hindustan, to Southeastern Europe, and to the Southern Russian Steppe.

The history of wheeled transport can be reconstructed on the basis of several sources: (1) written evidence; (2) archaeological findings of vehicles and chariots; (3) findings of draft animal bones in the osteological materials of settlements and burial grounds; (4) representations of wheeled transport in ancient monumental art, glyphs, figurines, etc.; and (5) representations of wheeled transport in petroglyphs.

In Western Asia, based upon discoveries from the burial grounds of Kish, Ur, and Susa, by the images found on the seals, mosaics, and reliefs, and by bronze and clay sculptures, wheeled transportation consisted predominantly of four-wheeled and two-wheeled ox-drawn vehicles with open or closed bodies (Fig. 6, 7). From the images, it was assumed that mules and onagers were used later. However, zooarchaeological data suggest that these draft animals were only big donkeys (Shnirelman 1980, 54–56).

Closed vehicles are known through the four-wheeled clay models found in Hammam, Tepe Gawra, and Susiana, and through the copper two-wheeled model in Tel-Agrab (Moorey 1969, 431–32; Ziegler 1962, pl. 7 N137; Özguç 1953, pl. LXIV). In the Caucasus, four-wheeled and two-wheeled ox-drawn vehicles with an open or closed body have been discovered in burials and as clay and bronze models (Kuftin 1941; Dzhaparidze 1960; 1976; Esayan 1966; 1976; Piggou 1969).

In Northwest Hindustan, wheeled transport appeared in the latter

half of the third millennium B.C., documented by discoveries in the Harappan settlements of clay and bronze models of two-wheeled vehicles and also of clay wheels and figures of draft cattle. Characteristic of the Harappa civilization were two-wheeled vehicles of two types: with an open body or with only a seat mounted over the axle (the latter type is evidenced by the model from Chanhu-daro) (Mackay 1951, 97; pl. XXI, 13; Piggott 1970, 200–202). Indian humpback cattle were used as draft animals in India during the Harappan period.

Information on the earliest wheeled transport from Northeast Iran is scarce and confined to the discoveries of clay models of wheels with double-sided hubs in Shah-tepe III-II and Hissar III (Schmidt 1937, 185, pl. XLIV, H2649; Arne 1945, 262), and also to the disputable representation of a two-wheeled vehicle with a cross-bar wheel assembled by mortise and tenon from three pieces, a platform with the driver before the axle, and a harnessed animal, probably a donkey (Littauer, Crouwel 1979, 40, fig. 21), on the cylinder seal from Hissar III B of the late third millennium B.C. (Fig. 32).

Central Asia is another zone of the Old World where wheeled transport was used in ancient times (Fig. 33). Its appearance in the first half of the third millennium B.C., in the period of Namazga III, is apparent from the discoveries of models of wheels with a two-sided hub and the figure of a harnessed bovine; and in the periods of Namazga IV and V, from the numerous discoveries of figures and heads of draft-cattle, and also models of wheels and vehicles of two types. Of these, type I is four-wheeled with the body open at the front and with raised sides (which distinguishes it from both the Western Asian and the Danubian versions); type II is (a) two-wheeled with raised sides, and, possibly, (b) with a closed body. In Central Asia, in contrast to other regions of the Old World, not only cattle, but also Bactrian camels were used as draft animals, as documented by numerous models depicted with the heads of draft animals (Kuzmina 1980b; 1983).

Two types of vehicles are represented on the silver bowl from Afghanistan now in the Louvre (P. Amiet in Ligabue, Salvatori 1988, 161, fig. 6) (Fig. 32). One is a heavy four-wheeled vehicle of the Central Asian type with raised sides and an open front drawn by two oxen by means of a Y-pole on which the driver's feet rest. At his back there is another figure. The second vehicle is two-wheeled, also drawn by a pair of oxen by means of a Y-pole, and it has a very small platform over the axle upon which the driver stands. The wheels of both vehicles are assembled by mortise and tenon from opposing segments fixed on the protruding hub. These are the so-called cross-bar wheels (like those on the seal from Hissar) (Littauer, Crouwel 1977a), which differ from both the Mesopotamian and Central Asian solid wheels of the third millennium B.C. and the spoked wheels of the true horse chariots used in the Eurasian Steppe and Levant in the early second millennium B.C. It is possible that such a wheel design was a transition to the spoked wheel proper. The numerous representations of camels in Bactria suggest that they could also have been used as draft animals.

Discoveries in southeastern Europe, including the Balkans and the Danube Region, included only four-wheeled, open ox-drawn vehicles. Some of these models feature a bull's head depicted on the front of the vehicle's body.

In the Southern Russian Steppe, E. V. Izbitser (1993) has inventoried some 250 burials, each with one or two vehicles (Fig. 8; Map 8). These were harnessed with a pair of cattle or bullocks by means of a yoke and a pole, and they had solid wooden wheels fixed on the axle, a protruding hub, and sometimes a closed body. All early vehicles that have survived are four-wheeled. At the same time, a number of graves containing only a single pair of wheels have been found, as have clay models of single-axle vehicles, which leads one to believe that two-wheeled vehicles existed as well, contrary to Izbitser's opinion.[11]

V. Kul'baka and D. Kachur (2000) counted many more vehicles of the Novotitarovo, Yamna, and Catacomb cultures (Maps 8; 9).

Open four-wheeled vehicles could have spread in the Steppe from both the Danube Region and the Caucasus, while the two-wheeled and closed vehicles might have arrived through the Caucasus (this is borne out not only by typological similarity, but also by the analysis of the yew of which one of the vehicles in Kalmykia was made) (Erdniev 1975, 16–17).

It has been suggested that vehicles also could have found their way to the Steppe through the third zone of a second-order civilization, namely, through Central Asia. This is unlikely, first, because the design of Central Asian vehicles is different from that of the Steppe version, and, second, because in the third millennium B.C. contacts between the farmers and the livestock herders were not intensive, and their zone of contact was interrupted by the Kelteminar fishermen. One hypothesis asserts that wheeled transport was brought to Central Europe in the third millennium B.C. from the Pontic Steppe (Waals 1964).

The crucial precondition for the formation of specialized pastoralism and for seminomadic pastoralism was the invention of a means of transportation that for the first time allowed the shepherds to follow their herds. Another precondition for this process was the use of metal tools needed for the manufacture of vehicles. The presence of metal is common at the Pit-Grave sites. The nature and composition of metals indicates that it was supplied to the Steppe by the farmers of Southeastern Europe, though metal artifacts made in the Caucasus also exist

(Chernykh 1966; 1978; Ryndina 1971). Some deposits in the Southern Urals, first in Kargaly, are likely to have been developed in the late Pit-Grave period (Morgunova, Kravtsov 1994; Chernykh 1998). The entire set of these interrelated innovations was put in place by Pit-Grave peoples by the latter half of the third millennium B.C. These conditions, for the first time in the history of the Old World, empowered these peoples to adopt a fundamentally new economic system adapted to the ecological niche of the Steppe. This was the economy that eventually led to the development of pastoral nomadism.

A pair of bullocks in a team moving at a speed of two miles per hour can travel twelve miles a day, which makes it possible to cover a distance of several hundred kilometers within one summer season (Fowler 1967). The establishment of mobile livestock herding had historic consequences. It gave the pastoral peoples the opportunity to make distant migrations, which led to the gradual development of vast territories and the formation of large-scale cultural communities unknown in the other regions of the Old World.

At the same time, in the mobile livestock economy, herd animals came to be easily alienable mobile property. This helped intensify exchange with neighboring farming peoples, but it also triggered clashes over herd animals.

The change in the political situation on the Steppe is evidenced by the appearance of ancient defenses in the last quarter of the second millennium B.C. In the settlement of Mikhailovka, for instance, at the final stage of its existence, ditches and defensive stone walls were constructed on the site around the central hill, running parallel to each other. The fortification of Mikhailovka correlates with the defensive constructions of the settlements in Southeastern Europe (Ezero IV) (Shaposhnikova 1985, 340–43). These processes developed further in the next historical epoch.

Chapter 3

The Eurasian Steppe in the Bronze Age

According to the paleogeographical data (Lavrushin, Spiridonova 1995a, b), the Subboreal period, which had started in the mid-third millennium B.C. and was marked, as already mentioned, by an abrupt cooling of the climate, at the turn of the third-second millennium B.C. gave way to a new temperature rise. Some researchers believe this caused the rise in moisture and humidity in the climate and subsequent change of the natural zones. In the second quarter of the second millennium B.C., the climatic conditions resulted in the development of the grass multiherbaceous Steppe and the spread of forested areas in which, alongside the prevailing birch and pine, lime and oak reappeared.

But if earlier the interaction of human beings and nature had been determined by the specific character of the Steppe ecological zone, with its inherent alternations of climate, now another natural factor acquired paramount significance—the richness of the territory in copper deposits. This metal, which came into use with the beginning of the Eneolithic period (or the Copper Age), already had assumed great importance among the Pit-Grave peoples, while the Catacomb Culture populations appeared to be skilled metalworkers, as apparent from the metal artifacts discovered in their burials.

The need for metal was stimulated by the transition of a portion of the Pit-Grave population to mobile livestock husbandry. Herd animals had become easily alienable moveable property, and they therefore required protection, giving rise to the use of weapons and hence to the promotion of metalworking.

Formerly metal had come to the Steppe from the very rich Bulgarian mines (Chernykh 1978; Ryndina 1971), but this source later was depleted, and the farming settlements were abandoned and the mines forsaken. This is linked by S. Todorova (1979) to an ecological crisis, the flooding of the territory. The search for local raw material led to the discovery of the Uralian copper beds, including the richest deposit at Kargaly, the initial use of which deposit E. N. Chernykh (1998) dates to the Pit-Grave period.

In the Urals, along the ancient fault line of Magnitogorsk-Orenburg,

a native copper outcrop was known; the prehistoric miners used this solely for the deposits of oxidized ores located in the upper levels easily accessible to them.

All together, the geographical, climatic, and demographic factors determined the unprecedented transformations in culture in the following period, and can be described as the fourth stage in the evolution of the food-producing economy of the Eurasian Steppe (Kuzmina 1996–97).

Proto-Urban Culture in the Urals

Two outstanding events in Russian science took place in 1973: A. I. Ashikhmina, as a member of V. F. Gening's expedition, examined the remains from the burial grounds of Sintashta in the Bredinsky district of the Chelyabinsk Region (*AO* 1973; 1974, 132, 133); while K. F. Smirnov, assisted by S. A. Popov, studied burial mound N 25 in the cemetery of Novy Kumak near Orsk (*AO* 1973; 1974, 175, 176), demonstrating the similarity of its collection of ceramic vessels with those of the Poltavka and Catacomb cultures.

While the burial ground of Sintashta yielded an exceptional set of artifacts (Gening et al. 1992), the burial mound of Novy Kumak for many years remained the only stratified site. In 1976, at a conference in Samara (Kuibyshev), K. F. Smirnov and I (Kuzmina, Smirnov 1976) identified among the published materials those ceramic types from sites in the territory of the Urals and Western and Northern Kazakhstan, including the sites of the Petrovka type discovered earlier by G. B. Zdanovich (1975; 1988) and assigned by him to the fifteenth century B.C. According to the stratigraphic data of Novy Kumak, we placed all of these artifact collections in the Novy Kumak chronological horizon, positioned between the time of the Catacomb Culture and the advanced Andronovo Culture of the Alakul type.

As to the chronological placement of this horizon, we, both having already researched the history of wheeled transport and horse cheek-pieces (K. F. Smirnov 1957; 1961; Kuzmina 1974a), dated it "prior to the Mycenaean shaft burials" (sixteenth century B.C.), where, as shown by A. M. Leskov, cheek-pieces analogous to those of the Steppe were present. Most important, though, is that, contrary to G. B. Zdanovich (who sought the origin of the Petrovka sites in the Kazakhstanian Neolithic, admitting the possibility that the Southern Central Asian and Abashevo components participated in their formative development), we advanced a bold hypothesis of a western influx of people that led to the development of the Novy Kumak horizon sites, constituted by the European cultures of Abashevo and Poltavka, and the European

Post-catacomb Culture of the MVK.[1] In conclusion, our opinion was that the founders of the Novy Kumak-type sites were Indo-Iranians, which confirmed the hypotheses we had developed earlier. These provisions were argued in the monograph "The Origin of Indo-Iranians in Light of the Latest Archeological Data," published in 1977 for the International Congress in Dushanbe.

Somewhat later, an article by V. F. Gening (1977), "The Burial Ground of Sintashta and the Issue of the Early Indo-Iranian Tribes," came out, in which he published some remarkable materials from the burial ground, dating them to the sixteenth century B.C. and acknowledging that Indo-Iranians were their founders.

In 1988 a monograph by G. B. Zdanovich, *Bronzovyi vek Uralo-Kazakhstanskikh stepei* (The Bronze Age of the Uralo-Kazakhstanian Steppe), appeared, in which the Petrovka complexes of Northern Kazakhstan were published and the results of their study summarized. In 1992 V. F. and V. V. Gening and G. B. Zdanovich published in full the materials of Sintashta.

Later, particularly in recent years, a large number of burial grounds in the southern Urals and western and northern Kazakhstan have been discovered and excavations of Ustye and Arkaim (now widely known) have been carried out (N. B. Vinogradov 1995a; G. B. Zdanovich 1995a; 1997). Excavations of the settlements of Kuisak (Malyutina, Zdanovich 1995) and Alandskoye have begun.

The material of the burial grounds of the Ural region, Kamenny Ambar (Kostyukov et al. 1995), Solntse II (Epimakhov 1996), and Bolshekaragansky (Botalov et al. 1996); of western Kazakhstan, Tanabergen II, Vostochno-Kuraili I, and Zhaman-Kargala (Tkachev 1998); and of northern Kazakhstan, Bestamak (Kalieva et al. 1992), have been published.

I. M. Batanina's (1995) analysis of the formerly classified space and aerial photographs of the earth's surface, which enabled the detection in the area between Magnitogorsk, Troitsk, and Orenburg of about two-tenths of the settlements (Gening et al. 1992, fig. 1), was important for the study of this type of complex (Map 10). Two more sites were discovered in the year 2000 (Epimakhov 2002, fig. 1).

At present the database is quite rich and representative of this horizon, and it is time for a broader interpretation. However, such an interpretive study is hindered by the fact that the bulk of the burial material has been published, but the material from the settlement sites has been described only in preliminary publications (N. B. Vinogradov 1995a; G. B. Zdanovich 1997), and it is difficult to assess them;[2] the typological classification of the Sintashta complex—the promised second volume—has not yet been published either.

It is also important to mention the significance of analyses of certain inventory categories such as the study of metallurgy and metalworking undertaken by S. A. Grigor'ev (1994). These data allow one to form a general idea of the cultures of the Steppe peoples in the Novy Kumak period.

In the Urals, settlements are usually situated by rivers, on high, steep promontories. Circular, oval, or square in plan, they are enclosed by defensive walls, constructed either of palisade walls made up of vertical logs (posts) 0.3–0.5 m in diameter or timber frameworks packed with clay. Around the outside circumference of the wall is a defensive ditch 1.5 m deep and 1.2–3.5 m wide, with 0.4 m high banks and 2–2.5 m wide gateways—wide enough for the passage of a vehicle or a chariot. At the large settlements of Olgino and Alandskoye, the walls are surrounded on the outside by vertical stone slabs or plinths over a meter in height. The planned settlements probably were constructed within a short time by a large, well-organized team. Some settlements underwent remodeling and repairs, sometimes changing the original site.

The interior layout of settlements, also built according to plan, is circumscribed between the interior and the exterior walls. Houses consist of adjacent rectangular or trapezoidal chambers with ceilings that possibly sloped toward the center of the settlement. Most chambers had hearths and wells. Outdoor drains were established. Timber and packed clay, or adobe, were used for the construction of house frames.

At the settlement of Sintashta, two rows of pisé walls form a circle 140 m in diameter, partitioned into compartments by radial walls (G. B. Zdanovich, Gening 1985, 151). The settlement of Arkaim, measuring 20,000 sq. m, is representative of the style of settlement plans that have double concentric circles of pisé walls divided by radial streets, often with a square inside (G. B. Zdanovich 1989b, 181, 182). The outer wall is 160 m in diameter, 4 m in width.

At an early stage, the settlement of Ustye was a fortress, circular in plan, built of a defensive wall of vertical pine logs and surrounded with a ditch 3 m deep and 4.5 m wide. In the second construction phase, the settlement was rebuilt into a rectangular fortress with rounded corners measuring 2 ha in area. The defensive wall is constructed of a timbered framework filled with earth. The settlement is again encircled with a ditch (N. B Vinogradov 1995a, 17). Inside, two sections of standard-sized chambers divided by the arterial road were discovered. The houses are rectangular, each measuring 160 sq. m in area, dug into the ground as deep as 0.4 m; the walls are constructed of a timbered framework filled with earth. Every dwelling has a round stone hearth with traces of metalworking and a circular pit that could have served as an ash-pit in the smelting process (S. A. Grigor'ev 1994).

Similar fortified settlements were discovered in Transuralia (Kulevichi III, Semiozernoye) and in Northern Kazakhstan: Bogolyubovo I, Novonikolskoye I, and Petrovka II. In Bogolyubovo and Semiozernoye, the ditch protected a promontory; in Novonikolskoye it enclosed a rectangular area measuring 95 x 60 sq. m; and in Petrovka, an area measuring 70 x 120 sq. m, divided into two parts by the inner ditch (Vinogradov 1983; Zdanovich 1988, 133).

The center of "the country of towns" located between Magnitogorsk and Orenburg is of special interest; it was in an area that probably held small ancient mines, not far from the Kargaly copper deposit, the location of the largest mines in the Urals (Map 10). The sites there are 40–70 km apart—the visibility range of watch-fires—which ensured reliable protection and control over all the territory (Gening et al. 1992, fig. 1) and which conformed to the ancient rules of frontier defense found in the Old World.

In recent years many burial grounds have been discovered and excavated (Fig. 9). Some of them, based on the similarity of ceramic types, belong to nearby settlements that are generally separated by a river or, less often, by hills. Examples are the complex of Sintashta, the complex of Arkaim, the Bolshekaragansky burial ground (Botalov et al. 1996), and Ustye and Solntse II (Epimakhov 1996). The burial grounds consist of earthen mounds containing one or two large central graves, usually with a wooden timber-roofed chamber. Sometimes, around the central grave, peripheral graves smaller in size were found; such tombs were more recent and involved a new excavation of the original mound.

A different picture was noted in Sintashta, where, in the major burial mound complex, forty burials were found, and in the minor, ten; a sacrificial altar was also discovered. But, unfortunately, because of the unique character of the complexes, many details failed to be recorded in the field, and therefore the structure of the complex is still not quite clear, and various interpretations reconstructing the history of Sintashta (for instance, Gening et al. 1992, figs. 198, 210, 213) seem fanciful.

At all the burial grounds, the deceased lie in a flexed position, usually on their left sides, though sometimes on their right sides, and, rarely, on their backs with their knees raised (Fig. 11). The orientation of the burials is variable. There are vessels and very rich accompanying inventory in the graves, including stone maces, copper axeheads, adzes, knives or daggers, socketed spears, socketed and shafted arrows, stone and bone arrows, bone shovels and parts of the compound bow, copper lash-wrappings, abraders, clay tubes for carrying air to the furnace (in three cases), and finally, a rich assortment of adornments (Fig. 13). One must remember also that many of the richest major burials were looted in ancient times.

In several cases, at the top of the mound, sometimes with clay daub and traces of fire, a funeral feast was discovered (Figs. 11, 12). It consisted of domestic animal bones, including those of the horse. On the ceiling of the pit, in the compartment between the pit wall and the chamber or in the grave itself, burials of horse pairs were found, often together with cheek-pieces, or only hides of sacrificial animals along with skulls and hoofs, or, finally, only cheek-pieces.

The horses usually lie on their sides, their heads turned in opposite directions, muzzles facing each other; or more rarely, one horse after another lying on the same side. In the burial ground of Bestamak, a gravel pit was cleared in which three horses stood vertically (Kalieva et al. 1992). Sacrificial altars have also been found.

A sensational discovery in Sintashta revealed impressions of spoked wheels at the bottom of the graves, traces of the most ancient chariots in the world. They were discovered in the burial grounds of Krivoye Ozero, Kamenny Ambar, and Solntse II, in the Urals; and Ulyubai, Berlik II, and Satan in Kazakhstan (Gening et al. 1992, fig. 57: 8; Zdanovich 1988, 76, 88, fig. 29: 2–6; 31: 9–12; Tkachev 1998; Kuzmina 1994a, b, c; Kostyukov et al. 1995; Anthony, Vinogradov 1995; Botalov et al. 1996, fig. 17: 10; 18: 4).

There is insufficient evidence to reconstruct the economy of this population. Evidence of farming is lacking. Cattle and sheep or goat herding was intensive, but pigs were uncommon. Horse breeding played an important role. The horse was used as a meat animal and also for transportation. According to P. A. Kosintsev (1995, 6), the Sintashtians' horses were purebred, semi-thin-legged, and stood on average 136–144 cm high at the shoulder. Five- to eight-year-old horses were used in the burial rite. These established facts testify to the high development and great cult significance of the horse.

Undoubtedly metallurgy and metalworking were the most important occupations of this society, indicated by the discoveries of an unprecedented amount of copperware in burials and remains of metalworking in almost every dwelling in the settlements, as well as by the location of the sites near mines. (Ore from the mine of Kisenet was found in the neighboring settlement of Ustye.) Several types of hearths at Ustye were used in ore smelting: one in the shape of a groove clad with stone, one a two-chambered hearth, and one dome-shaped. Many had a chimney-like flue and were connected to a circular pit that served as an ash-pit. The use of these hearths was an important step forward in the development of metallurgy when compared to the Pit-Grave period, for such hearths could be fired at higher temperatures. The development of firewood-thermal potential is viewed by L. White as a decisive factor in the history of civilization.

According to S. A. Grigor'ev's (1994) data, rich oxidized ores from the upper part of sulfide-copper deposits were utilized. The slags have an increased arsenic content, which is indicative of not only the use of the Uralian deposit of Tash-Kazgan ores but also the alloying of copper, that is, the making of arsenic bronze, an important innovation discovered after the Pit-Grave period. What is important is that the stimulus for metallurgical innovations at Sintashta came from the West, namely, from the East European Fatyanovo-Balanovo and Catacomb metallurgical traditions.

Metallurgy by its nature was a localized, domestic production, as apparent from its presence in every settlement that has been excavated; there are no signs of craft specialization. At the same time, the scope of production leaves no doubt that the Sintashtians, though not specialized craftsmen, engaged in the communal metallurgical enterprise and worked to produce metals exported to the Volga and Don regions, which lacked the sources for raw materials. Petrovka metallurgy was a result of an inherited metallurgical tradition (S. A. Grigor'ev 1994, 122–26).

Thus, at the Novy Kumak stage, a number of significant interrelated innovations were introduced: (1) spoke-wheeled chariots were employed for minor skirmishes; (2) methods of horse training and harnessing to a chariot by means of cheek-pieces were discovered; (3) the extraction of local copper deposits on a large scale was conducted; and (4) metal smelting and alloying were perfected, thereby improving the quality of metal artifacts. Finally, the spatial organization of settlements, which followed a clear-cut plan with a well-designed fortification system, was established. All these factors demonstrate the tremendous advances in social evolution that occurred during the Novy Kumak stage.

The peoples that mastered these innovations gained in strength, leaving behind their neighbors, and this enabled them to establish wide cultural contacts in Eurasia and to begin moving along the future Silk Road routes.

As mentioned above, a quarter of a century ago K. F. Smirnov and I (1977) advanced a bold hypothesis that the sites of the Novy Kumak horizon belong to the group of European cultures and appeared in the Urals and Kazakhstan as a result of the migrations from the West of the peoples of the Abashevo, Poltavka, and the MVK cultures. It is now possible for these conclusions to be validated, specified, and substantially corrected. Our first concern is to address the origins of the cultures and their independent chronological sequences.

The lower level of the Kuisak settlement is assigned to the Pit-Grave

Culture, the ceramics of the middle level reflect elements of both the Pit-Grave and Abashevo cultures, and the upper level is Sintashtian (Malyutina, Zdanovich 1995). At the settlement of Beregovka I, the lower level was identified as the Abashevo Culture, the middle, as the Novy Kumak Culture, and the upper, as the Timber-Grave Culture (Vasil'ev et al. 1995a, b). In the cemeteries of Tanabergen, Kuraili, and Zhaman-Kargala, and burial mound No. 11 at Bolshekaragansky, the major graves were of the Poltavka Culture and the later secondary graves (added at a later time) of the Sintashtian type. In the Alexandrovka IV burial ground the complexes are mixed; Abashevo vessels were found together with those of the Poltavka Culture (Tkachev 1998). On the Don, in the Kondrashkinsky burial mound, the major burial is of the Catacomb Culture, and the secondary graves (added at a later time) are of the Abashevo Culture (Pryakhin et al. 1989). On the lower Volga, many sites of the Catacomb Culture preceded those of the Timber-Grave Culture (Malov, Filipchenko 1995). These facts document the integration of the Abashevo and Poltavka cultures leading to the development of the Sintashta-type sites and indicating the participation of representatives of the Catacomb Culture.

Within the Novy Kumak horizon, the earlier placement of the Sintashtian-type sites and the later placement of the Petrovka-type sites was established based on stratigraphic data from the settlement of Ustye, the necropolises of Krivoye Ozero, Stepnoye I, and Kamenny Ambar (N. B. Vinogradov 1995a).

Thus these chronological placements have established that the sites, which we previously assigned to the Novy Kumak horizon, indeed fall into two chronological phases or types: the earlier Sintashtian type and the succeeding Petrovka type. The Sintashtian type is most likely to have its origins in the Urals at the contact zone of various Southern Russian cultures. The Sintashtian is characterized by a number of archaic features (for instance, the presence of supine burials) and the prevalence of a ceramic style that combines elements of the Poltavka, Post-Catacomb, and, particularly, Abashevo Culture. According to N. B. Vinogradov, at this stage the predominant settlement plans were circular and oval in configuration.

In the Petrovka-type sites, reflecting, probably, a partial movement of the population eastward, the ceramic styles are no longer hybridized, instead showing the influence of the local traditions.

Burials and burial grounds with inventories similar to those of Novy Kumak, including ceramics and other ritual goods such as cheek-pieces and almost every kind of weapon found in the Urals, have been discovered in the Middle Volga Region. These include the burial at Alekseevskoye and the burial grounds of Lopatinsky II, Utevka VI, and Potapovka (the Potapovka-type site is used as the general designation of such sites) (Agapov et al. 1983; Vasil'ev et al. 1991; 1992; 1994; 1995a, b). The ceramic collections of the Samara sites show elements more typical of the local Poltavka Culture.

The same artifact inventory (or assemblage)—cheek-pieces and weapons—was found in the burials and cemeteries of the Don Region. These are the burial mounds of Filatovka, Usman, Pichayevsky, Vlasovsky I (burial mound N 16), Pavlovsky (burial mound N 57), Vvedensky, Kondrashovsky, Bogoyavlensky, Kondrashkinsky, the Selezni burial ground, and so on (Sinyuk, Kileinikov 1976; Vinnikov, Sinyuk 1990; Sinyuk 1996; Pryakhin et al. 1991; Pryakhin 1992; Pryakhin, Matveev 1989; Moiseev, Efimov 1995). A. T. Sinyuk (Sinyuk, Kozmirchuk 1995, 42; fig. 1: map) assigns them to the Petrovka–Abashevo-type site, A. D. Pryakhin to the Abashevo Culture.

From the ceramic assemblages of a number of the Don Region sites, the Poltavka and Catacomb ceramic styles and characteristics can be identified. The origins for these ceramic assemblages are disputed: K. F. Smirnov and I spoke of a Western influence, whereas V. S. Bochkarev (1995) introduced the notion of a Volgo-Uralian center of origins, accepted by me, but disputed by A. D. Pryakhin, who considers the Don Region as a culture area within the larger cultural community of the Eurasian Steppe.

Nevertheless, it is clear that, within a short period of time, a new culture spread throughout the Steppe from the Don to Central Kazakhstan, characterized by advanced metallurgy and the emergence of chariot warfare. Its center was situated in the Southern Urals, where fortified fortresses have been discovered. V. V. Otroshchenko believes that the origin of this new culture came out of the necessity to protect the area of the copper mines, the metallurgists themselves, and their products. This opinion seems convincing to me.

Many aspects of everyday life as well as the nature of the demographic processes of the Sintashtian society remain unknown. First, the archaeological levels at the settlement of Arkaim and the lower levels of Ustye have relatively few artifacts; also it is not clear what caused the fire at Arkaim, forcing its abandonment. K. Jettmar (1997) interpreted the site as a religious and cultural center. This conclusion is unacceptable because Arkaim is clearly a center of metallurgy, and no special cult structures have been discovered there. As for the layout of the site, interpreted by Jettmar as a model of the universe, the Avestan Vara—a finding independently substantiated by myself (Kuzmina 1994c, 71–73; 1975), I. M. Steblin-Kamensky (1995, 165, 167); and N. L. Chlenova (1995, 174–84)—indicates that Vara is not a ritual center, but "a dwelling for cattle, a dwelling for people" and, thus, indeed, it

correlates with the Sintashtian settlements. In addition, K. Jettmar believed Arkaim to be a unique structure, though, in essence, it is an ordinary settlement. It should be mentioned that, although neither in the Potapovo Range of the Volga Region, nor in the Abashevo Range of the Don Region have settlement-fortresses yet been recorded, this type of site is present in the Steppe in the settlements of Kamenka in the Crimea and at Liventsovka and Karatayevka in the Don Region, close to the area of the MVK Culture (Bratchenko 1976: 110–16), which points to the Western—namely, Eastern European—origin of the town fortresses in the Steppe. N. Ya. Merpert (1995), who investigated the geographic distribution of circular fortresses, has shown that there were multiple centers for the origins of such fortresses. This architectural style did not originate in Anatolia or in the Balkans, but at the sites of Central and Eastern European Eneolithic cultures (Moravian, Lengyel) and, particularly, at Tripolye, which maintained close contacts with the Steppe. Previously I put forth an alternative point of view, that the circular layout of the fortresses began as an imitation of a Steppe military camp made up of vehicles located around the circumference of a circle (Kuzmina 1994c). Today this point of view seems unsubstantiated, especially if one considers the intricacy of the layout and the elaborate construction of the fortresses.

Second, the contrast between the monumental nature of the architecture and the relatively small number of interments in the burial grounds is striking. Third, at the settlements the dwellings are more or less identical with regard to their dimensions, functions, and artifact inventories. The design of the architectural plan might have required an administrative head who also oversaw the labor of huge teams of builders. Fourth, although in most graves the artifact inventory is similar, the most prestigious symbols such as the mace are present not only in the largest and richest burials (Nelin 1995) but also in others. However, some burial mounds are distinguished by their larger dimensions, the intricate construction of the chamber, and their riches, presumably indicative of social stratification within the society, not yet accompanied by differences in property ownership.

The presence of chariots, horses, and weapons in burials can be explained in terms of the Indo-Iranian tradition in which these are regarded as attributes and symbols of the privileged class of warrior-charioteers—the *rathaeshtars*—the class to which the king belongs. Proceeding from this, a hypothesis has been advanced that in the Sintashtian society social stratification began to occur, resulting in the emergence of a military elite (Smirnov, Kuzmina 1977; Kuzmina 1994c). This hypothesis was challenged by D. G. Zdanovich (1997), but it still seems convincing. I also wish to draw attention to the fact that

in the large burials where there is a rich assortment of weapons, very often adzes are found—a tool used by wood-workers, not warriors. At three examples of military burials—in the burial grounds of Kamenny Ambar, Solntse II, and Bestamak—pieces of ore and nodules were found, which testifies to the fact that the deceased were not only warriors but also experienced metallurgists. This brings to mind the image of an ancient Indo-Aryan god, Tvashtar (literally, "creator"), whose name derives from the common Indo-European stem **tuer*, as in the Russian *tvorit'* ("to create") and *tvorets* ("creator"), a term that refers to both an experienced master and a god. Tvashtar in Indian mythology is the inventor of the chariot, metallurgy, and other crafts.

It appears that in the Sintashtian society an elite group emerged consisting of persons endowed with creative and administrative abilities who also performed military functions as well. If such a scenario is true then the burials of warrior–charioteers belong to this top stratum (distinguished by status markers and not wealth), while the burials of ordinary members of the community probably are to be found in the cemeteries or other types of burials. Undoubtedly, this question needs further study and a statistical analysis of the burial inventories.

G. B. and D. G. Zdanovich (1995) have raised the question as to whether these sites represent the formation of proto-urban civilization on the Steppe. The sites cannot be identified as early towns, for they lack two key functions: they are neither centers of specialized craft, nor the residential centers of a rich aristocracy and other leaders. Thus one apparently can speak only of an incipient trend toward the establishment of proto-urban civilization.

The Chariots of the Eurasian Steppe

The chariots at the Sintashta– and Petrovka–type sites are reconstructed from the wheel impressions found in the specially prepared groove pits found at the bottom of the graves (Figs. 11, 12). They have been found in the Ural region: in Sintashta, burials NN 5, 12, 19, 28, 30 (V. F. Gening et al. 1992, 130; fig. 56; 163–67; fig. 78; 80; 183, 184; figs. 91, 93: 2; 203, 205; figs. 106–8; 209, 210, 214, 215; fig. III) and, possibly, in burial N 16 and in the minor burial mound (Gening et al. 1992, 153, 339); in the burial grounds of Krivoe Ozero (Anthony, Vinogradov 1995, 38; fig. on p. 36; 39); Kamenny Ambar 5, graves NN 8 and 6 (in the latter, one wheel) (Kostyukov et al. 1995, 162, 163; fig. 9); Solntse II, burial mound N 4, grave N 1; 5, grave N 2; 11, grave N 2 (Epimakhov 1996, 26, 29, 33, fig. 4); and also in the later burial ground of Vetlyanka IV, burial mound N 14, burial N 6 (Gorbunov et al. 1990, 31, 32, 36).

In Northern Kazakhstan, chariot wheel impressions were found in the burial ground of Berlik II, burial mound N 2, grave N 1, and burial mounds N 10 and Ulyubai (G. B. Zdanovich 1988, 76; fig. 31). In Central Kazakhstan, at the late Petrovka complex of the Satan burial ground, burial mound N 1, fragments of a chariot were found. These consist of the wooden remains of the body's rectangular platform, measuring 106 x 60 cm, and, beneath the platform, two grooves: one with the remains of a felloe (outer wooden rim where spokes are attached) from a burnt wheel, the other with a felloe fragment, a circular spoke slot, the rotted remains of the hub, and, beneath the felloe, a piece of dyed-red rawhide belonging to a leather tire, and four bone pegs fixing the tire to the wheel (Evdokimov 1981, 434; Novozhenov 1994, 158–60, fig. 97).

During the course of the excavations, it was apparent that the lenticular-base grooves are 0.8–1.1 m long (only in one grave are they shorter), usually 0.2–0.4 m wide and 0.15–0.35 m deep. Segments of wheel impressions also include three or four rectangular spokes (in section, 3–4.5 cm wide), and at Satan, the spokes appear to be circular. The reconstructed chariot, based on these impressions, shows the wheel to be 0.9 m in diameter, with 8–12 spokes. The space between the two wheels (the gauge) is standardized, 1.2–1.4 m. According to data from the Satan burial mound, the chariot body is rectangular, measuring 1.06–0.6 m, and the wheels have leather rims. The wheels are 0.2–0.4 m from the sides of the grave, perhaps determining the maximum size of the protruding hub of the wheel. Along with the chariots in the pit or on the roof, there is a pair of horses or skulls with cheek-pieces, to symbolize the draft team that pulled the chariot.

This evidence enables one to establish the presence in the Sintashta-Petrovka society of two-wheeled chariots with spoked wheels, drawn by a pair of horses. V. F. and V. V. Gening and G. B. Zdanovich (1992, fig. 80; 94; 108) and D. Anthony and N. B. Vinogradov (1995, fig. on p. 38) are responsible for the reconstructions of these chariots.

M. Littauer and D. Crouwel (Littauer, Crouwel 1996a, 934–35) disagree with these reconstructions, since they believe the current extant information insufficient for a complete recreation. They also point out that the size of the protruding hub was insufficient to assure the steadiness of the chariot. Therefore they considered these wheeled vehicles not to be true chariots but "proto-chariots" (two-wheeled carts). Again they challenge the hypothesis that the origins of the chariot occurred on the Steppe (a view advocated by D. Anthony and myself), and insist upon supporting their earlier conjectures that the chariot originated in Western Asia.

As for the size of the protruding hubs resulting in instability, there

are no comparative examples for the Sintashtian chariots, since the only existing chariots from Egypt are many centuries later in date. Furthermore, it is very likely that a dismantled chariot or only some parts representing the chariot were placed in the grave. The latter possibility is more likely when we consider that only one wheel was placed in Kamenny Ambar, grave N 6, and in grave N 8 there was an imitation of a cheek-piece. In many burials, instead of a pair of horses, there was just a pair of skulls, so these are ritual chariots—*vehicula religiosa*. From such ritual chariots, it would be difficult to reconstruct the early prototype of a chariot used in warfare.

Those researchers who argue against a Steppe origination for two-wheeled chariots, following E. V. Izbitser's opinions (1993), have emphasized the fact that there is an absence of two-wheeled vehicles that could have been the prototype for the chariot from the Steppe (Fig. 8). We have already challenged this opinion. In actual fact, two-wheeled vehicles with solid wheels are common at the Pit-Grave and Catacomb burials (for instance, Storozhevaya Mogila, Pervo-Konstantinovka, burial mound N 1, burial N 8; Marievka, burial mound N 11, catacomb grave N 27; Lola, etc.) and are represented by clay models (for instance, in the Three Brothers burial mound (Novozhenov 1994, 133, 140).

Two-wheeled carts with solid and cross-bar wheels, cattle- or, sometimes, camel-drawn, make up a large group of petroglyphs (rock-carvings) found on the Steppe, as explained by V. A. Novozhenov (1994, 89, 97, 103; figs. 51, 53) (Fig. 20). Thus, in contrast to the Danube Region but similar to Western Asia (the Caucasus) and Central Asia (the Steppe), the principal types of wheeled transport were all present: wagons and two-wheeled carts, with closed bodies (Gei 2000). The development of this technology and wheel construction parallels that found in the ancient East.

The necessary conditions for the invention of the chariot originated during the Eneolithic period of the Steppe. And, in contrast to Western Asia, where the horse was practically unknown, in the Steppe the horse—this essential element—was also present. Thus, this suggests that our opinion (P. M. Kozhin, N. N. Cherednichenko, V. B. Kovalevskaya, V. S. Sorokin, D. Anthony, myself, and other researchers) about the independent, and, indeed, prior, invention of the chariot in the Steppe remains valid. An independent center for the origins of the chariot on the Steppe is not ruled out by S. Piggott (1983) and P. R. Moorey (1986).

In the attempt to resolve the issue of the origin of chariots on the Steppe, an analysis of horse cheek-pieces (part of the bridle) is essential.

At sites of the following cultures—Post-Catacomb, on the Dnieper and the Donets, and in the Crimea; Abashevo, in the Don Region, in the Volga Region, and in the Urals; Potapovka type, in the Volga Region; Sintashta and Petrovka types, in the Urals, and in Western, Northern, and Central Kazakhstan—cheek-pieces in the shape of a shield with multiple prongs or inserted spikes made of antler were found (Fig. 14). I mapped and classified these using typological classifications and the evolution of technological developments over time (Kuzmina 1994c).

V. A. Novozhenov considerably augmented my classification system using the functional (use) classifications (Fig. 16). The early type of the bridle has one strap on the horse's nose, fastened together with the types I-A and I-B cheek-pieces. The further development of the bridle is linked with the appearance of the cheek-strap fastened together with the type-II cheek-pieces with additional minor orifices; the next improvement is the appearance of inserted spikes (the type III cheek-pieces).

A classification based on even more finely divided types, but not entirely convincing, was put forward by Yu. V. Goncharova (1996; 1999). Here, the typological and functional methods of classification were combined, and secondary markers such as the characteristics of the spikes and the shape of the upper projection were used to create type categories. However, she still obtained the same results we did, as did S. Penner (1998), who examined the geographic spread of cheek-pieces and Mycenaean ornaments throughout the Old World.

According to our researches, the earliest cheek-pieces were those from Eastern Europe with solid spikes, followed by cheek-pieces with a special upper projection for the nose band; finally, cheek-pieces with inserted spikes, sometimes with a hole or slot in another part, were present. We all believe that the origin for the invention of cheek-pieces was Eastern Europe, from which such artifacts spread to the Balkans and Greece.

A. D. Pryakhin and V. I. Besedin (1998) disagree with these classification systems and instead identified two types of cheek-pieces, the Eastern one with no ornament (the Urals, Kazakhstan) and the ornamented Western one, whose center of dispersion was the Abashevo Culture of the Don Region, a conclusion that is, in fact, not disputed. V. S. Bochkarev (1998) had the final say in this discussion. In his report at the State Hermitage Museum, given at the conference in honor of B. B. Piotrovsky's ninetieth birthday, he put forth an elaborated version of my typology, drawing attention to the raised border of the cheek-pieces and suggesting the probable connection between the evolution of the cheek-pieces and that of the bone buckles of the MVK Culture. The typology of the latter is thoroughly worked out (Sava 1992; Litvinenko

1995b; 1996; Yu. P. Matveev 1996) and has been placed within the chronological sequences for the Monteoru, Glina III, Stekenberg, Otomani, Tay, and Vittenberg cultures, allowing the earlier phase of the MVK Culture to be dated to the eighteenth–seventeenth centuries B.C. V. S. Bochkarev, preceded by E. Zaharia (1990), dated the cheek-piece from Monteoru to the early period and came to the conclusion that the Mycenaean cheek-pieces, used for the chronological placement of my cheek-piece typology, came to Mycenae from the Danube Region and were a later derivative of the Danubian ones. These interpretations led V. S. Bochkarev to assign the cheek-pieces and, accordingly, the whole Sintashtian horizon, to the earlier time (see Appendix in this book).

At present the data base for studying the cheek-pieces has expanded, and the number of the known artifacts is more than 200 specimens. New discoveries, including those from stratified sites, have been made in the Urals and in Eastern and Northern Kazakhstan. The type-I cheek-pieces have been found in the Sintashtian graves with some surviving Catacomb and Poltavka features in the necropolises of Bolshekaragansky, Tanabergen, Kuraili; the type I and II examples come from the Krivoye Ozero burial ground; the type-II cheek-pieces, from the Sintashtian graves of Kamenny Ambar, Solntse II, Zhaman Kargala, and Bestamak.

New discoveries of cheek-pieces from the Abashevo sites in the Urals and in the Sintashtian ones in Western Kazakhstan have been made, but, unfortunately, the materials are unpublished. On the Volga, new examples of the type-III cheek-pieces have been found in the Petrovka burial mounds of Zolotaya Gora, Berezovka, and on the Don, in the Selezni burial mound (Kalieva et al. 1992; Matyukhin 1994; Kostyukov et al. 1995; Anthony, Vinogradov 1995; Epimakhov 1996; Botalov et al. 1996; Tkachev 1998; Dremov 1996; Pryakhin, Besedin 1998). These all bear out the established typology.

The most ancient type-I cheek-pieces are characteristic of the European MVK and Abashevo cultures, which form the basis of the formation of the Sintashtian-type sites, and of the latter (Fig. 15). The type-I examples have no ornament. The type-II cheek-pieces from the Danube to the Volga are often decorated with the Mycenaean ornament, and the type-III cheek-pieces, typical of the Abashevo (or Pokrovka-Abashevo) complexes of the Don Region, of the Pokrovka and Petrovka, as well as of the Alakul ones, are likewise decorated with the Mycenaean ornament, which independently corroborates the evolutionary scheme and proves that the European Steppe was the origin of chariots.

The chronology of the Novy Kumak chronological horizon sites is

based on correlations: (1) of the cheek-pieces and ornaments with Shaft Graves IV of Mycenae, whose date, 1570–1550 B.C., is terminus post quem of the type-I cheek-pieces; (2) of the cheek-pieces and horse brasses with the Monteoru Culture; and (3) of the segmented clay beads with a number of European cultures.

Contacts with the Danube Region intensified at the late stage of the MVK Culture, which spread westward up to the Danube (Chernyakov 1996; Litvinenko 1996). Cultural exchange between Greece and the Danube Region occurred overland and by sea. In the Crimea, the MVK Culture settlements (Kamenka) and fishermen-merchants' harbors with lighthouses have been found, which is evidence of trade along the coast (Kislyi 1996). This allows us to demonstrate our hypothesis for far-reaching European contacts with the Steppe and to assume that by that time, trade networks had already been established along the coast of the Black Sea up to Hellas.

As previously mentioned (Bochkarev 1992; Kuzmina 1992; 1994c; 1998b), the absolute chronology of the Sintashtian-type sites is based on the European chronology system.[3] In recent years Mycenae has been assigned to a century earlier, on the basis of (1) correlations with the sites of Egypt and the Near East; (2) revision of the scheme of G. Caro and A. Furumark; and (3) the date of the volcano eruption on Santorini island, established with the help of ^{14}C analysis (S. Dietz 1991; Warren, Hankey 1989; Betancourt 1987; Manning 1988; Åström 1987; Dickinson 1994). There also exists a tendency to push the traditional chronology of the Middle European sites of stages A 1, A 2 by Reineke to earlier dates, based upon the dendrochronological data (R. Krause et al. 1989; Randsborg 1992; Kuniholm 1993; Bochkarev 1992). The dendrochronology, worked out in Europe, assigns the traditional dates to a century or two earlier, but these dates are still much later than the calibrated radiometric dates.

The use of the Mycenaean chronological sequences has been challenged by V. I. Besedin (1996), who disputes the fact that the Steppe ornament style came from Mycenae and instead naively proposes this ornament style originated in the Abashevo Culture (why not the Catacomb one?) (Fig. 15). However, he did not account for the unquestionable data and vast literature on the spread of the Mycenaean ornamental style throughout Europe, Egypt, and the Near East. In actual fact, the Mycenaean ornamental style is based on the very specific usage of spirals. The convergence of both these styles (Mycenean ornament and Abashevo) is impossible.

V. I. Besedin's view was dismissed by V. A. Trifonov (1996a, b). Here he again raised the old question of the possible Near Eastern origin of

the Mycenaean ornamental style, emphasizing the presence of circular and spiral ornamentation in Kul-Tepe (Kanish).

The question of the origins of Mycenaean ornamental style is very interesting and deserves further study. Nevertheless, it is worth noting that variants of spiral and circle ornament were spread throughout the Old World, including the Danube Region. As for the ornamental style of the Kul-Tepe artifacts (Özguç 1986), it differs greatly from the Mycenaean. The latter shows particularly close similarity to the ornamental style of a number of the Early Bronze Age complexes of Southeastern Europe.

V. A. Trifonov rejected the hypothesis that the Eurasian Steppe was the center of origin for the chariot in the Old World by referring to M. V. Gorelik's (1985) work, which allegedly proved the Western Asian origin of horse chariots. In fact, Gorelik failed to give a typological classification of wheeled transport, examining together both the heavy four-wheeled warrior wagons drawn by big Syrian donkeys and mules and the light, two-wheeled horse chariots, which led him to erroneous conclusions.

As for the equine representations on the Syrian and Palestinian seals and seal impressions (Porada 1980), they are too schematic, the depicted species is unidentifiable, and likely feature not horses but other sub-species within the horse family (Figs. 6, 7). Only in the sculptural art of Kul-Tepe are there images that can be unambiguously acknowledged as those of horses (Özguç 1950).

The fact that over two hundred cheek-pieces were found on the Steppe, as opposed to very few in the ancient Near East, and the fact that the stratigraphic position of the Near Eastern cheek-pieces is mostly undetermined and dates no earlier than to the mid-second millennium B.C., support our argument for the earliest origin of horse chariots on the Eurasian Steppe. The total absence of any horse bones from the Western Asian osteological materials also supports our argument. Even S. Bökönyi's identification (1991) of two equidae from Norsun-tepe in Anatolia as horses has been questioned by the prominent paleozoologist A. von den Driesch (Boessneck and von den Driesch 1975; 1976). Although, judging from textual materials dating to the turn of the third to second millennium B.C., the horse was already known in Western Asia, even in the latter half of the second millennium B.C. (after the spread of horse chariots by the Indo-Aryans into Western Asia), horses appear to have been imported, exotic, and incredibly expensive. Documents from the archives of the kings of Egypt and the Hittite kingdom and from Kul-tepe (Moorey 1986; Yankowska [Yankovskaya] 1956; 1981; 1982) support this conclusion. Thus the rar-

ity of the horse in Western Asia helps to explain why the invention of the horse-drawn chariot did not take place here.

At the same time, in the Steppe, in the burials of the Catacomb Culture type, two-wheeled vehicles, called *bigas*, are known; discovery of horse bones and ritual horse burials are evidence for the development of a horse cult. At the sites of the MVK Culture, as well as at the Abashevo sites, the most ancient and most archaic types of cheek-pieces were discovered, lacking both the upper projection for the nose-band and the Mycenaean ornamental style.

These data when considered as a whole contradict the views of M. Littauer and V. A. Trifonov, who dispute the hypothesis for the Steppe origin of the chariots. As a result of the new discoveries of dozens of cheek-pieces in stratified sites, the origins of the horse chariot in the Steppe can be further supported. More to the point are V. A. Trifonov and other authors' objections to our—K. F. Smirnov's and my (Smirnov, Kuzmina 1977)—chronology of the Novy Kumak horizon sites, following along the lines of A. M. Leskov's research by cross-dating the cheek-pieces with Mycenae.

On the basis of the new radiocarbon dates of the burial grounds of Krivoye Ozero, Potapovka, and Utevka VI, we may now assign an earlier time period for the Sintashta-Petrovka-type sites. This shifts the Novy Kumak horizon to the turn of the third-second millennium B.C. (N. B. Vinogradov 1995a; Anthony, Vinogradov 1995; Kuznetsov 1996; Trifonov 1996a, b) (see Appendix).

The dispute over the use of Mycenae chronology and the calibrated dates for support of this date of origin has caused heated debates. The calibrated dates have been accepted neither in Germany nor in Russia. They conflict greatly with the historical chronology of Egypt and the ancient Near East (Chernykh 1997) and allow too large a margin—for the Sintashta burial mound, for instance, 2250–1390 B.C. without calibration (Kuzmina 1994c) (see Appendix).

The dispute over the radiocarbon dates bears a direct relation to the issue of the origin of chariots: if the calibrated dates are accepted, the Eurasian chariots and bone cheek-pieces appear to be earlier than the Western Asian ones.

In this connection, a discovery on the Zeravshan near Panjikent in the Zardcha-Khalifa burial ground is of great interest (Figs. 16, 17, 18). Sintashtian-type shield cheek-pieces and a bronze pin with a depiction of a horse, similar to the Eurasian Steppe style and craftsmanship (the closest comparisons can be made to the horse pairs found on the knife from Seima and the golden ring from the Mynshunkur burial ground in Semirechye [Kuzmina 1994c, 256]), were found alongside artifacts typical of the Bactria-Margiana complex: a metal mirror with a protruding handle, a silver vessel with a spout, a toilet bottle, etc., characteristic of the Namazga VI period and possibly late Namazga V (Bobomulloev 1993; Bostongukhar 1998).[4]

These mirrors can be compared to examples from Takhta-Bazar, from the chance discoveries in Southern Bactria studied by E. During Caspers (1997), who found parallels to them in the ancient East, and the mirrors, vessels, pins, and bowls published by V. I. Sarianidi and P. Amiet (Ligabue, Salvatori 1988: Sarianidi, in Ligabue et al., 1988, fig. 14; Amiet in Ligabue, Salvatori 1988, 161, fig. 10–12).

These comparative materials enable one not only to define more precisely the age of the Sintashtian cheek-pieces, but also to confirm my hypothesis about the decisive influence of the Steppe on the spread of the horse and the horse chariot in Southern Central Asia (Kuzmina 1978a) (Fig. 20).

In Northern Central Asia, familiarity with the horse is documented by the presence of horse bones in the osteological materials of the Tazabagyab Culture settlements (Kavat 3, Kochka 15, Bairam-Kazgan 2), by the horse figurine at the Kavat 3 settlement in Khorezm, and by the findings of horse bones at settlement N 16 in Kairakum (Itina 1977, 138, 195; fig. 69: 2, pl. III, IV). In Central Asia and Kazakhstan the petroglyphs of two-wheeled chariots with four-, six-, and eight-spoked wheels, drawn by a pair of horses, are also known. They are represented in the petroglyphs of Tajikistan (Tekke-tash, Akjilga), Kirghizstan (Saimaly-tash), Southern (Tamgaly, Karatau), and Eastern (Smagul, Moinak) Kazakhstan (Kadyrbaev, Mar'yashev 1977; Novozhenov 1994; Sher 1980; Samashev 1992). The closest comparisons to the chariots of the Central Asian and Kazakhstanian petroglyphs are in rock carvings from the Altai, in Tuva, Mongolia, and Xinjiang: these regions make up a unified zone for depictions of horse chariots in the Old World. In recent years the possible dating of a considerable number of chariots in this zone of petroglyphs to the Bronze Age has been achieved. For example:

1. Chariot representations, analogous to those in the petroglyphs, have been found on vessels of the Timber-Grave and Andronovo cultures (Figs. 20, 21).

2. In Tuva, chariot drawings have been found in association with Okunevo masks.

3. In Mongolia, on the Darvi-Somon deer stone—dating from the mid-first-millennium B.C. based on the weapon represented—a chariot with horses depicted in the "Scythian" manner and stylistically different from other representations can be assigned to the Bronze Age.

4. The chariot representations of the Steppe zone are similar to the pictographs in ancient Chinese characters of the Yin and Zhou periods.

Since chariots and horses in China were borrowed from Eurasian Steppe populations, this analogy is chronologically significant.

Thus, multiple evidence—representations of the horse chariot in petroglyphs and on vessels of the Bronze Age; findings of chariots and draft-horses with chariot harnessing in burials; findings of bone cheek-pieces in burials and at settlements; and, finally, the discovery of ritual horse burials and multitudinous examples of horse bones in the osteological materials of settlements—all prove that by the second millennium B.C., horse breeding was particularly developed among the Eurasian pastoral peoples of the Timber-Grave–Andronovo group. The horse cult came from their Steppe ancestors, who appear to have domesticated the horse as early as the fourth millennium B.C.

These data allow one to assume that the pastoral peoples of Central Asia had many connections with groups from the northern part of the Steppe, thus introducing the settled agricultural groups of Turkmenistan and Bactria to the horse (Figs. 19; 32; 33). In the cultures of the latter area, the horse began to play an important role only in the period of Namazga VI, since it is at this time that there is evidence for active contacts between pastoralists and farmers, and by the movement of pastoral peoples southward.

In Southern Turkmenistan, at the time of Namazga VI, essential innovations in wheeled transport took place, such as spoked wheels suitable for light vehicles and horse-drawn chariots. The spread of this vitally important innovation is apparent from the discoveries at the Namazga-depe settlement of a wheel model with a double-sided hub and brown-painted asymmetrical spokes, and an accentuated hub; at Tekkem-depe, of a model with six red-painted spokes; and at Elken-depe, of a wheel with nail impressions, possibly also resembling spokes. A clay horse's head in the Namazga VI level in the upper part of the eponymous settlement, and the first authentic discovery of horse bones at the settlements of Turkmenistan—Kelleli 1, Namazga-depe, Takhirbai 3 (Tsalkin 1970b)—are assigned to the same time. Moreover, it is particularly important that the verifiable discovery of horse bones came from settlements where Steppe-type pottery was also found.

It is possible that these Steppe peoples also played a certain role in developments in India (Fig. 20). Although it has been argued on the basis of questionable evidence that the domestic horse was already known to the Harappa Culture populations, it was only in the Post-Harappa epoch that it became widespread in India. The horse cult was also introduced then, as witnessed in the ritual horse burials or inclusion of their images in the burials of Swat (Katelai, Loebanr) and Gomal (Gumla, period V, and Khatkhala, period B). Such ceremonies are unknown in India, Southern Central Asia and Iran, and Western Asia

(Kuzmina 1977a, 34), although well known in the Eurasian Steppe of the Eneolithic period. The possible influence of Central Asian peoples on the development of horse breeding in India is also verified by the paleozoological data that show that the horses of Swat belonged to the Eastern breed (Azzaroli 1985, 353–55) and by the stylistic manner in which chariots are represented in petroglyphs. Here the chariots are executed not in the Western Asian manner—in profile—but in plan (overhead view)—characteristic of the chariot petroglyphs of Northern Eurasia and Central Asia. This important stylistic peculiarity most likely reflects Central Asian influence on the development of wheeled transport in India in the latter half of the second–first millennia B.C.

The appearance of the Bactrian camel as a transport animal in Baluchistan may also be attributed to Central Asian influence (Fig. 35). At the Post-Harappa settlements of Pirak, camel bones and clay camel figurines were found, including those with holes designed for harnessing to vehicles, and, along with these, representations of horses and horsemen. J.-F. Jarrige dates this assemblage to the latter half of the second to early first millennium B.C. (Jarrige, Santoni 1979, vol. I), notes that Bactrian camels were atypical of previous cultural periods in Baluchistan, and thus attributes the presence of Bactrian camels and horses to Central Asian influences.

All of these data point to the great importance of the chariot and the horse for the development of the future Great Silk Road routes.

The Crisis of the Complex Economy, the Development of Nomadism in the Eurasian Steppe, and the Origins of the Great Silk Road Routes

The presence of fortified settlements and advanced metallurgy were necessary conditions leading up to the development of towns in the Steppe. The specific ecological situation of the vast Steppe, however, was exploited not by the economic intensification and specialization of herding and farming, but by the expansion of pastoral activities more suitable to the Steppe. The pastoral peoples thus abandoned the process of urbanization that had begun to take shape in the eighteenth century B.C. and instead adopted extensive livestock husbandry, which required larger areas of land. The large Timber-Grave and Andronovo communities came into existence. Their florescence marked the following—fifth—stage of economic development in the Steppe (Kuzmina 2003).

The fifth stage—the fifteenth-thirteenth centuries B.C.—is characterized by the peak florescence of the Steppe culture, apparent from the large quantities of Timber-Grave and Andronovo settlements and

burial grounds, exceeding by several times the number of the sites of previous periods.

The locations of the settlements, situated on the flood plains or on the upper terraces above the floodplains, the very areas that today are subject to flooding, points to the fact that the climate was drier and warmer during the Bronze Age. According to the paleobotanical and osteological studies in the Ukraine, in the Volga Region, and in the Ural region (Kremenetsky 1991; Spiridonova 1991; Lavrushin, Spiridonova 1995a, b), the vegetation and fauna were similar to the present. The author's studies and analyses of charcoal from the Elenovsky area settlements, as determined by G. N. Lisitsina, indicate the presence of lime, birch, aspen, and fir (the Siberian pine); the Siberian pine does not exist in the Asian Steppe zone today. This is supported by the presence of beaver bones in many settlements of the Urals and Kazakhstan, where nowadays this animal is extinct. But the main fauna representatives are the Steppe Zone animals. Such landscape and climatic conditions were favorable for conducting a complex economy.

By the second millennium B.C., the situation in the Steppe had become stable, and the Timber-Grave and Andronovo communities had consolidated (Figs. 24–28). This is apparent from the unification of funeral rites and the types of ceramics. The population had a settled way of life; people inhabited unfortified settlements, usually consisting of large, long-term, semi-subterranean houses. In the forest-steppe the dwellings were constructed of framework-and-post, and in the Steppe stone was often used.

Farming was practiced, as made apparent by the discovery of grains and stems of grasses (wheat, possibly rye, and millet), stone querns, pestles, hoes, horn reapers, numerous sickles, and storage pits for grain in dwellings. Naturally, this being the Steppe, grass pollen was discovered in palynological analyses. Judging by the scope of production, plow rather than hoe cultivation was practiced. Farming was quite important in the forest-steppe and insignificant in the Steppe. At Steppe settlements there was a lack of storage pits for grain and a smaller quantity of agricultural implements, and the location of some settlements was in the open Steppe, characterized by wormwood (artemesia) and saline soils.

The fundamental basis of the economy was livestock husbandry. In the Timber-Grave Culture, the herd consisted of cattle and sheep or goat, horse, and, in much smaller numbers, pig (Tsalkin 1958; *Arkheologiya* 1985). In the Andronovo Culture, the pig was completely absent. Analysis of the osteological materials from the Elenovsky area allowed V. I. Tsalkin (1972b) to establish that the Andronovo Culture population bred horses both as transport and food animals. Discoveries of bone devices, possibly designed for milking mares, and beaker-form vessels, suggest the possibility of the invention of *kumiss*.

The Andronovo Culture, for the first time in the world, developed three breeds of horses: (1) the small horse, 128–136 cm high at the shoulder, similar to modern Kirghiz horses; (2) the middle-sized horse, 136–152 cm high at the shoulder, weighing 350 kg (these were already present in the Sintashtian sites and clearly predominant in the herd); and (3) the tall, highbred, gracile horse, 152–160 cm at the shoulder, employed as draft-animals for the chariots. The latter were used in sacrifices, placed in the burials of warriors, and represented in numerous petroglyphs. Horses of this elite breed may be the ancestors of the modern "Akhal Teké" horses and of Thoroughbred racers bred from them. A sophisticated level of horse breeding is a distinguishing feature of the Andronovo livestock economy, and it determines the outstanding role the Andronovo Culture peoples played in the history of Eurasia (Kuzmina 1997b).

Another peculiarity of Andronovo livestock husbandry is the presence in the herd of the Bactrian camel. This was domesticated in the late fourth millennium B.C. in Southern Central Asia and, possibly, in Iran, a conclusion validated by osteological materials and by figures of Bactrian camels harnessed to vehicles (Kuzmina 1963a; 1978b; 1983; 1994c). In the Andronovo Culture, its use is documented by the presence of camel bones (Alekseevka, Arkaim, Atasu, Ust'-Narym, and Petrovka II), by ritual burials (Aksu-Ayuly, Telzhan-Kuzeu, Mily-Kuduk, and Begazy), by a small figure (Ushkatta), and by representations of camel-drawn vehicles in petroglyphs.

Cattle and sheep/goat occupied the central place in the herd. According to V. I. Tsalkin's data, members of both the Timber-Grave and Andronovo cultures raised cattle of the Eastern European breeds: long-horned massive bulls 126 cm high at the shoulder and weighing 350 kg and large sheep 73 cm high and weighing 50 kg.

The osteological materials show essential regional differences in the herd composition: in the forest-steppe, cattle prevail; in the Steppe, sheep or goat. (At the Andronovo sites in the forest-steppe, cattle make up 37–52% of the herd and sheep or goat, 37–44%; in the Steppe, 26–34% and 50–63%, respectively.) However, although the sheep is more prolific, producing up to seven lambs a year, in the Steppe, cattle prevailed in the actual herds. When we take into account the weight of individuals of different species, it appears that the Andronovo Culture population's meat supply was composed of 60–70% beef, 20–30% horse, and only 10% mutton.

The first authentic evidence not only of beef cattle breeding, but of dairy cattle breeding, also comes from this period, documented by the

analysis of the contents of pots from the Elenovsky area burial grounds and by the emergence of vessels with holes designed for cheese-making.

In the fifteenth to thirteenth centuries B.C., very orderly methods of keeping livestock were apparent. Data from a number of settlements show that young animals were used mostly for food: 50% of the individuals slaughtered were under two years of age, 75% under three. An important achievement was keeping cattle stalled; the emergence of this practice is validated by the layout of many Timber-Grave and Andronovo dwellings that have a fenced-off chamber with organic remains on the floor.

The emphasis on using cattle for both beef and dairy secured a stable beef-and-dairy diet for the society, and this led to population growth and a demographic explosion. This form of livestock herding suggests that the economy was settled, with the cattle returning every evening to the settlement for milking. This sets a limit to the possible extent of the radius for pasturage for the livestock population, for in the Eurasian Steppe 1 sq. km of pasture can feed six to seven head of large ungulates, at the most.

Pastoral activities may be in conflict with limited environmental resources. First, the constant growth of the population requires more and more food, i.e., a bigger livestock population. Second, even with the most rational system of using pastures radially over a year, in which the herd is constantly driven within a range of several kilometers around the settlement, in the course of twenty to twenty-five years overgrazing of the steppe occurs, and the productivity of pastures falls by a factor of two to four. Their regeneration takes approximately half a century (Mordkovich 1982, 186–88).

These factors necessitated the movement of the Timber-Grave and Andronovo settlements to a new location several dozen kilometers away every twenty to twenty-five years, which accounts for the fact that the archaeological components of the Steppe settlements represent a single occupation, relatively small. Also, the burial grounds of these settlements have relatively few burials, each containing people of only one generation. The demographic analysis of the Elenovsky area sites, comparing the amount of dwelling area at the settlements with the number of burials in the corresponding burial ground (and taking into account the average lifespan in Andronovo society, which, according to V. P. Alekseev, was about thirty years), shows that the settlement and the burial ground probably functioned from twenty-five to fifty years (Kuzmina 1974b; Evdokimov 1984).

In the fifteenth to thirteenth centuries B.C., such ecological limitations resulted in society's extensive transition, by means of territorial

expansion and the development of new ecological niches in foothills and deserts, facilitated by the domestication of the camel. The constant pressure of the surplus population stimulated the gradual expansion and development of new territories. This explains both the large quantities of fifteenth- to fourteenth-century B.C. sites in the Steppe zone, and the territorial expansion of the Timber-Grave and Andronovo cultures, archaeologically well documented.

The Timber-Grave peoples occupied the whole Steppe and forest-Steppe zone; on their border with the forest, they influenced the formation of the Prikazanskaya Culture (Khalikov 1969). Some small Timber-Grave groups forced their way to the Danube Region (the late "Ocher burials" group), and others penetrated into Central Asia, evidenced by burials in the Yangi-Yul' oasis in Tashkent, Orekhovskoe, the burial grounds of Patma-sai, Karalemata-sai, and Parau in Western Turkmenistan (Kuzmina 1963c; 1988; 1994c; Kuzmina, Vinogradova 1996; Mandelshtam 1966), and participated in the formation of the Tazabagyab Culture in Khorezm (Itina 1977).

The Andronovo peoples of the Alakul type populated the Southern Urals and a considerable part of Kazakhstan (except Eastern Kazakhstan), reaching Southern Siberia (the Ermak burial ground near Omsk) (Map 11; Figs. 24–25). The Andronovo peoples of the Fedorovo type settled in the territory from the Urals and the greater part of Kazakhstan (except Western Kazakhstan) up to the Yenisei, and in Siberia they advanced into the forest zone (Komarova 1962; Kuzmina 1985; 1994c; Maksimenkov 1978; Matyushchenko 1973a; Molodin 1985; Vadetskaya 1986), where they influenced the establishment of the food-producing economy and the development of the Andronovoid cultures (Kosarev 1981; Obydennov 1986; Obydennov, Shorin 1995).

The discovery of such sites in the Tian Shan and the Pamirs testifies to the development of a new ecological niche, namely, the highlands. The Andronovo influence, mediated by the tribes of Xinjiang and Northwest China, can be traced all the way down to Anyang in the Henan Province (Kozhin 1977; Kuzmina 1973b; Antonova 1988; Varenov 1989).

In the sixth stage—the thirteenth or twelfth to ninth centuries B.C.—the economic crisis was aggravated by an ecological one. A considerable cooling of the climate occurred. The territory of a number of the Timber-Grave and Andronovo settlements of the developed stage, situated on the first terraces above the flood plain, was blocked now by river banks and inundated with spring floods.

As has already been mentioned, the complex economy, with its settled domestic livestock breeding, confined the growth of the herd to the size of the nearest pastures, which hampered the further develop-

ment of this type of economy. The solution to the crisis lay in the more productive type of livestock husbandry, namely, the driving-to-pastures (or *jailau*) method. Under the driving-to-pastures system of livestock herding, the herds are driven off to remote pastures, and every season the pastures are changed, which enables an unlimited increase in the livestock population. This more progressive system makes it possible to harmonize the needs of the society with the possibilities of different natural niches. Several types of seasonal nomadism are known: meridional, desert, vertical, and so on (Rudenko 1961). In some regions these types had already been established in the previous period. Meridional transhumance implies that in winter cattle are driven off to the South, where it is warmer and the blanket of snow is thinner. (Horses are capable of getting fodder from under the snow, provided that the blanket of snow is under 0.5 m; sheep can also get fodder, along with horses.) The emergence of this form of transhumance is documented by late Timber-Grave and Andronovo sites in the Caspian Sea North Littoral and Transcaspia (Galkin 1992). Under the desert nomadic system, herdsmen drive their herds to the desert in early spring when it is watered and covered with vegetation. The existence of this form of transhumance is borne out by the finding in Khorezm of Andronovo-type ceramics over the abandoned dwellings of the Tazabagyab Culture (Itina 1977). The vertical form suggests that in spring the herds were driven to highlands covered with alpine plants and tall herbage (Mordkovich 1982, 65–71).

Such sites are known in the Tian Shan (Arpa, and numerous burial grounds of the Semirechye type) (Bernshtam 1952; Kuzmina 1970; Galochkina 1977) and the Pamirs (the Yuzhbok burial ground, etc.) (Litvinsky 1972) (Fig. 26). As a rule, stationary winter settlements are situated in foothills and in well-protected valleys on fertile soils, often in the vicinity of mines.

The distribution of Bronze Age sites in the Steppe, deserts, and highlands shows that herdsmen established optimal routes, taking into account the presence of water sources, subsoil water for digging wells, and mountain passes. Superimposing this map of the locations of Bronze Age sites on maps showing the routes of medieval and twentieth-century nomads brings one to the conclusion that the traditional paths were optimal (A. V. Vinogradov, Kuzmina, et al. 1973; Kuzmina, Lyapin 1984). These routes were also used for the movement of caravans. By tracing the origins of their operation, it can be inferred that the precursors for the Great Silk Road routes began as far back as the Bronze Age.

The new form of economy was furthered by the selection of a herd fit for migrations. It was composed of specialized breeds of horses and

the Bactrian camel, with the pig either absent (the Andronovo Culture) or not playing any important role (the Timber-Grave Culture). Essential changes in the herd composition over time can be singled out: in the Late Bronze Age the sheep population increased (Shortandy-Bulak: by 81%), and the horse numbers doubled (Tsalkin 1972b; S. Ya. Zdanovich 1981). These animals are the best for the nomadic economy, for they are capable of getting fodder from under the snow.

Another important condition for the transition to mobile livestock husbandry in the twelfth to ninth centuries B.C. was the invention of a light framework dwelling, the protoyurt (Orazbaev 1970; Narynov 1980; Kuzmina, Livshits 1987). Traces of such round or square small dwellings have been discovered throughout the Steppe.

The third important factor was the emergence of horseback riding linked to fighting. Spindle-shaped bone cheek-pieces, both three-hole ones with the holes in two planes (Kirovo, Ilyichevka, Volynska Greblya, Atasu) and three-hole ones with the orifices in one plane (Dereivka, Usatovo, Subbotovo, Zhirnokleevka, Yazevo, Shortandy-Bulak, Kent) date from the thirteenth–twelfth centuries B.C. and from the ninth to seventh centuries B.C. at Sialk VI, Hasanlu (K. F. Smirnov 1961; Leskov 1971; I. I. Sharafutdinova 1982; Margulan 1979; Varfolomeev 1988). They have broad analogies in the West. There is a mold of a bronze cheek-piece of this type at the settlement of Dalverzin; actual cheek-pieces are found in Iran (Giyan 1, Sialk VI, Hasanlu). They were designed for harnessing a horse for riding. Extensive evidence of the spread of the new fighting method in the ancient East is also recorded in this period.

The first riders represented in the monumental art of the ancient Near East were those in scenes of the battle of Kadesh, in Tell el Amarna and Saqqara, dating back to the fourteenth century B.C. (Schäfer, Andrae 1925, 381; Yadin 1963, 219–24). In the Hittite army, the emergence of riders is attested by a relief from Zincirli and a seal from the Louvre (Meyer 1953, 32; Herzfeld 1937–38, 51). But it was only from the late twelfth century B.C. that detachments of riders began to play an important role in ancient Eastern armies. The quantity of representations of riders in art gradually grew, reflecting the growth of their role in troops (Kuzmina 1971; 1973a; Azzaroli 1985).

From the twelfth century B.C. armed riders were known in Assyria (Handicock 1912, 355, pls. XVII–XVIII; Meissner 1920, 217–19; Yankovskaya 1956, 44; Ebeling 1951; Kammenhuber 1966; Saggs 1963; Hanfmann 1961). From the turn of the second to first millennium B.C., mounted warriors formed part of the Israelites' army (the Bible, 1 Kings 5: 4, 26). In Tell Halaf a relief representing a rider was found (Yadin 1963, 284–86).

In the Assyrian army mounted warriors were divided into those wielding lances and those wielding bows (VDI 1951: 2: 296, 299; 3: 330). In the early first millennium B.C., representations of lances appeared in monumental art: in the reliefs of the palaces of Shalmaneser II in Khorsabad and of Ashurbanipal in Nineveh, in the murals of the palace of Shalmaneser III in Til Barsip (Layard 1849, 1852; Botta, Flandin 1849–50; Thureau-Dangin, Dunand 1936; Yadin 1963, 415–17, 442–43, 450, 451), and also in glyptics (Herzfeld 1937–1938, 50, 51).

These innovations developed slowly in the economy of the Steppe peoples. Only in a complex economy could they establish the driving-to-pastures method. These data, contrary to the opinion of M. P. Gryaznov (1957) and G. E. Markov (1973), show that the transition to mobile pastoralism did not have the character of a spontaneous leap but was a long natural process caused both by the specifics of the Steppe ecology and the whole course of the evolution of pastoralism, which lasted for centuries. This process ultimately resulted in the establishment in the Scythian period of the mobile form of pastoralism—nomadism.

The Origin and Spread of the Bactrian Camel

The issue of the domestication of Bactrian camels has long been disputed. According to F. Pritzwald, the Bactrian camel came into use very late: only in the tenth century B.C. did representations of Bactrian camels and mention of them in texts appear in Assyria (Pritzwald 1924, 259–67). It is assumed that Bactrian camels were brought by the nomads from Central Asia, where they still exist (Walz 1954, 84, 85).

In the late nineteenth century, the wild Bactrian camel, the *khavtagai*, was found in the Gobi Desert, where it was described by N. M. Przhevalsky (Przewalski) and then by G. E. Grum-Grzhymailo, P. K. Kozlov, and Sven Hedin. At the present time, the range of the wild Bactrian camel has diminished and is limited by the Transaltaian Gobi and possibly the bend of the Tarim; in Mongolia only a few hundred *khavtagai*s have survived (Bogolyubsky 1929, 14, 15; Khaveson 1940, 117; Sokolov 1961, 109–12; fig. 21). A. G. Bannikov (1945) has proved that the surviving Bactrian camel has not become wild, as some researchers suggest, but is wild per se, a conclusion validated by pronounced morphological differences. It is the opinion of zoologists that the *khavtagai*'s range used to be considerably broader and stretched westward up to Kazakhstan.

The issue of the origin of Bactrian camels now can be solved, as a result of discoveries of camel bones at sites in Turkmenistan that date from the fourth millennium B.C. on, which allows one to date the domestication of the Bactrian camel precisely to this time (Fig. 33).

At farming settlements in Southern Turkmenistan, domesticated camel bones were found at Anau in the upper level of the southern mound (Duerst 1908, 383–84; Zeuner 1963, 359), dating from the latter half of the fourth millennium B.C., and in Geoksyur 5 in the second construction phase, in the level of Namazga III, the first half of the third millennium B.C. (Tsalkin 1970a, 156). These offer the most ancient evidence of the domestication of Bactrian camels in the Old World.

In the Bronze Age, the camel was already widespread: in the level of Namazga IV among the fauna of the settlements of Shor-depe, Altyn-depe, Khapuz-depe, Namazga-depe, and Kelleli 1; in the level of the Namazga V epoch at Ulug-depe; Namazga VI, at Tekkem-depe and Madau (Tsalkin 1970a, 157; Ermolova 1970, 226, 227).

In Bactria the appearance of the camel is recorded by findings of bones at the settlement of Sapalli-tepe dating to the early second millennium B.C. (Askarov 1973, 131; 1977, 120, pl. XLV, 13; Batyrov 1974, 135). The representations of Bactrian camels in the figural art of Altyn-tepe, Taichanak-depe, Khapuz-depe, Ulug-depe, Taip, and Takhirbai 3 are indicative of the development of camel breeding in Central Asia (I. Maksimov 1976, 76; figs. 13, 16; Shchetenko 1968, 22; figs. 12: 2, 12, 13; Masson 1959, 15; fig. 13: 1, 4–8; 1970, pls. XV, 6; XVI).

In Margiana, clay camel figures abound at the settlements of Togolok 1, 2, and Gonur 1; the camel is represented on seal-amulets (Sarianidi 1976, 61, 62; fig. 18; 1990, pls. XXIII: 11, 12, 14; XXIV: 12, 13, 15, 16; LXXVII: 13; LXXXVIII: 1), and also on a bronze mirror from Takhta-Bazaar (Fig. 33). In Bactria, images of Bactrian camels occur on stone seal-amulets from the Sapalli-tepe burial (Askarov 1977, 120, pl. XLV, 13) and also copper figures (Pittman 1984, 43; figs. 10, 11; Salvatori 1989).

Where was the domestication center of this animal species located? S. N. Bogolyubsky (1929, 14, 15) located the Bactrian camel's original home in the Eurasian Steppe, between 40° and 50° latitude north of the equator. My assumption has been that the domestication center of the Bactrian camel was in Central Asia and Kazakhstan (Kuzmina 1963a, 39, 40). F. Bulliet, B. Compagnoni, and M. Tosi outline an area that includes Central Asia and Central and Eastern Iran (Bulliet 1975, 141, 148; Compagnoni, Tosi 1978, 87–100).

At the settlement of Shakhr-i-Sokhta in Sistan in phase VII and VI levels, dating from 2700–2600 and 2600–2500 B.C., respectively, several bones of undetermined species were found, as well as camel dung and camel hair used for yarn, neither of which can help identify the camel species. The authors do not rule out the possibility that the animal from Shakhr-i-Sokhta was a Bactrian camel (Compagnoni, Tosi 1978,

91–95; fig. 1, 2, 4). In Southern Iran, at Khurab, a copper axe whose head featured the representation of a camel was discovered (Maxwell-Hyslop 1955, 161; Zeuner 1955, 162, 163; pl. XXXVI). The animal's appearance has stirred up a dispute: only one hump is distinctly visible, but the camel's form is similar to that of the Bactrian camel. The date of the Khurabian head is also disputed: C. Lamberg-Karlovsky assigned it to 2600–2400 B.C. (1969, 163–68), whereas E. During Caspers (1971, 60–64) dated it to the early third millennium B.C.

As unquestionable evidence of the familiarity of the Iranian population with the Bactrian camel, the discovery of Bactrian camel bones at the Shah-tepe settlement in level III dating back to the mid-third millennium B.C. is useful. According to W. Amchler (1939, 80, 122), the Bactrian camel appeared at the Caspian Sea Southeast Littoral as a result of borrowing from the peoples of Northeast Turkestan, its original home.

V. I. Tsalkin (1970a, 156, 157) believed that Central Asia could not have been the center of the domestication of the Bactrian camel because he was not aware of camel bones in the Mesolithic and Neolithic levels, "which could evidence its diffusion into this territory in a wild state. Thus the possibility of its local domestication is also ruled out." At the present time the situation has changed: bones of the wild camel *Camelus Knoblochi-Nering* were determined at the paleolithic site of Samarkand (Lev 1972, 17–29). Bactrian camel bones were discovered at the Neolithic burial ground of Tumek-Kichidjik in the delta of the Amu Darya (Vinogradov 1974, 500, determination by N. M. Ermolina) and at the Kelteminar site of Tolstova in Khorezm (excavations by A. V. Vinogradov, determination by V. I. Bibikova). One should also keep in mind that the ecological conditions in Central Asia are quite suitable for this species to live here in a wild state, and also that Central Asia is situated near the present-day home of the wild Bactrian camel, whose range has diminished during the historical period. Most important, though, it is in Central Asia that the most ancient bones of the already domesticated Bactrian camel in the Old World, dating from the fourth to third millennium B.C., were discovered, as are all the most ancient indisputable representations of this animal dating back to the third to second millennium B.C. These findings of bones and figures are numerous, not isolated. The representations of Bactrian camels harnessed to vehicles, which have no parallels in the entire Old World, bear out the wide economic use of the camel as a transport animal in this region (Kuzmina 1980b).

All these lines of evidence lead one to acknowledge that Central Asia was certainly the principal center of the domestication of the Bactrian

camel. It is possible that Afghanistan and some eastern regions of Iran were also part of the most ancient zone of the use of Bactrian camels. As previously mentioned, the Near East in ancient times was the home of the one-humped camel, the dromedary, while the Bactrian camel was practically unknown there until the late second millennium B.C.[5]

The oldest and most unusual representation of the Bactrian camel is the Mesopotamian cylindrical seal of 1800–1400 B.C., which features two men sitting face to face on the Bactrian camel's humps (Bulliet 1975, 62; fig. 20). All other representations and mentions of the Bactrian camel in the Western Asian texts date only from the Assyrian period. This data has been repeatedly cited in the literature (Kuzmina 1963a; Yankovskaya 1956, 40; Salonen 1956; Walz 1951; 1954; Luckenbill 1927; Horn 1950; 1952; Lambert 1960; Bulliet 1975, 153–59).

The most ancient written information concerning the Bactrian camel is contained in the Kuyunjik inscription of Tiglath-Pileser I (1115–1077 B.C.) and a document of the Assyrian king Ashurbeikal (1074–1057 B.C.), about a purchase of Bactrian camels from merchants involved in trading with the East. After that, Bactrian camels are recorded in the inscriptions and annals of Ashurnasirpal I (1050–1032 B.C.), Shalmaneser III (858–824 B.C.), Shamshi-Adad V (823–811 B.C.), and Sargon II (721–705 B.C.). Representations of Bactrian camels appeared in Assyria in the early first millennium B.C.: they are found on the Black obelisk in Nimrud, on the gates of Balawat, in the relief in a military camp in Kuyunjik, and also on seals from the period of Shalmaneser III. The texts declare that camels came into Assyria as a tribute from the East.

In the early Assyrian documents the Bactrian camel is called by the Semitic word denoting the dromedary, *gammlu*, but with a note that it is two-humped; in the eleventh century B.C. the term *udru* appeared, which goes back to the Iranian name of the Bactrian camel (Salonen 1956, 85–87; Kent 1953, 118, 178). This is important linguistic evidence of the fact that, first, the Bactrian camel became known in Western Asia only in the late second millennium B.C., and, second, that the Semitic peoples became acquainted with this animal through contact with Iranian-speaking people, from whose language its name was derived. These linguistic data correspond well with the hypothesis that it was in this time that the Iranian-speaking people appeared in the territory of Iran and advanced gradually westward, bringing with them Bactrian camels and horses, which is reflected archaeologically in the spread of representations of these animals in Iran in the early first millennium B.C. (*7000 ans*: 78, pl. XXXI: 3); the cult of these animals among the Iranian-speaking peoples was well established and survived

into the Achaemenid and following periods (Kuzmina 1963a, 42, 43; 1978a, 103–8; Obel'chenko 1978, 68–81; Kadyrbaev, Maryashev 1977, 176, 177; Korol'kova 1998, 137–49).

In connection with the issue of the establishment of the ancient range of Bactrian camels, it is important to emphasize that the Achaemenid reliefs of Persepolis represent Bactrian camels as a tribute of the Parthians, Arahosians, and Aryans (Schmidt 1953, pls. 19, 30, 33, 39, 41; 1970, 148–49), i.e., the boundaries of the spread of this species remained almost untouched as against the Eneolithic period, which validates the hypothesis about the localization of the Bactrian camel's original home in Central Asia and, possibly, in Afghanistan and Eastern Iran.

Thus, archaeological data has established that in Central Asia, the Bactrian camel was domesticated in the fourth millennium B.C. and in the third to second millennium B.C. was widely employed as draft power for harnessing to vehicles with solid wheels, a distinguishing feature of wheeled transport in Central Asia in the Bronze Age (Fig. 34). Evidently, from the farmers of Central Asia, the camel, already in a domesticated state, was borrowed by the people of the Andronovo Culture, who used it as draft power for vehicles, as reflected in the petroglyphs and plastic art of Khorezm and Kazakhstan (Itina 1977, 90; Kuzmina 1994c, 203, 257; figs. 34: 10, 11; 55: 8, 9).

Chapter 4

Archaeological Cultures of Southern Central Asia

The vast territory of Central Asia is surprisingly diversified in its climate and landscape (deserts, dry Steppe, foothills, mountainous areas, fertile oases), which has meant that there have been great variations in the pace and course of the cultural development of different parts of Central Asia.

In the extreme south, in Turkmenistan, beginning in the fifth millennium B.C., the development of the most ancient farming culture of the former Soviet Union was already under way. This was the Anau, which belonged to the circle of highly developed cultures of the ancient East.

Groups of hunters and fishermen, who as far back as the third millennium B.C. had started to change over to a food-producing economy, occupied the northern Steppe areas in the Eneolithic period. Their cultural relations with the Anau population contributed to the quick mastering of metallurgical, livestock-herding, and farming skills. The highly advanced Anau Culture greatly influenced the Steppe peoples with which it had contact in succeeding periods. The interaction of these two large population groups substantially determined the peculiarities of Central Asian development.

In the Bronze Age several historical and cultural regions formed here: Southern Turkmenistan, the lower, middle, and upper parts of Transoxiana, Ferghana, and Kirghizstan. These will be discussed below.

Southern Turkmenistan

The Anau Culture: Namazga VI

By the second millennium B.C., the Namazga VI Culture emerged in Southern Turkmenistan, developing from the previous Namazga V Culture (Map 13). The Southern Turkmenian groups failed to recover from the crisis that had shaken the ancient farming communities in the late third to early second millennium B.C. A major part of the settle-

ments of the Namazga V period was abandoned, and the occupied dwelling areas of the others contracted in size. Large capital towns like Altyn-depe were replaced by small settlements, not exceeding 1–2 ha in area. Examples of this are the southern mound of Anau (Pumpelly 1908), Elken-depe (Marushchenko 1959), Tekkem-depe (Ganyalin 1956b), and a small settlement in the northern part of Namazga-depe (Ganyalin 1959) in the lowland plain of Kopet Dagh, and also Takhirbai and, somewhat earlier, Auchin-depe in the delta of the Murghab (Masson 1959).

Despite the disturbances experienced by the late Anau peoples, the development of their productive forces continued. The irrigation system underwent refinements, land in the delta of the Murghab was developed, and new settlements arose there. Irrigation farming remained the principal economic base in Turkmenistan (at Elken-depe grains of barley and wheat and grapeseeds were found). It is likely that livestock-herding acquired greater significance than before. The herd included cattle, sheep or goat, pig, and camel, and there is some indication that the domestic horse appeared at this time.

The traditions of construction were unvarying: in the Namazga VI period the Anau Culture population inhabited dwellings made of adobe, adjacent to which were outbuildings. Residential areas were divided by small streets (Namazga-depe). Defensive walls were constructed around the settlements.

The dead were buried in pits on the territory of the settlements, as had been the case during previous stages of the development of the Anau Culture. Such burials were discovered at all the settlements of the Namazga VI period. However, a new funeral rite spread as well: at Yanghi-Kala (Ganyalin 1956a) and on the site of a trolley and bus depot in the city of Ashkhabad (the study by A. A. Marushchenko), burial grounds were found in which the deceased were lying in a flexed position on their left sides in pits of varying orientation. Beside the bodies stood several vessels, and adornments had been put in the graves.

Pottery-making preserved the traditions of wheel-made production. All tableware was manufactured by means of a fast potter's wheel and was fired in two-tiered furnaces of perfect construction (Sarianidi 1958). Large, splay-bottomed pots, conical bowls, and exquisite stemmed vases were common, their surfaces red or gray and often burnished. On the Murghab, white-slip vessels were also found, side-by-side with pottery of the former type.

The development of the metalworking industry is proved by findings of metalware. Production tools are represented by the sickle of the advanced Western Asian type, the crescent-shaped knife, two-edged knives, awls, and punches. Various types of daggers, javelins, and spears were also widespread at that time.

In the Namazga VI period the population of Southern Turkmenistan kept up active relations with other farming communities. It may be assumed that contacts with Asia Minor, from which came pins with ribbed and five-pointed heads (the burial ground in Ashkhabad) were of great importance. Apparently, the distribution of the first ironware in Central Asia (A. F. Ganyalin found iron beads in a rich burial at Namazga-depe [Kuzmina 1966]) can be ascribed to the influence of Asia Minor, where iron came into use as long ago as the end of the third millennium B.C. (V. V. Ivanov 1963).

Contacts with southeastern regions—Baluchistan and India—are attested by findings of stone beads with a circled pattern (Masson 1959). Such beads are known at the sites of the Jhukar Culture, which succeeded the Harappa Culture and, according to the opinion of a number of researchers, was formed by groups that came from the North, possibly Aryan in their ethnic composition (Piggott 1952; Gordon 1958; Fairservis 1956).

The social system of Anau society in the latter half of the second millennium B.C. can be reconstructed on the basis of a study of pottery and metalworking, which undoubtedly had a craft character, and also on the basis of an analysis of burials. Some of these are distinguished by the richness of their inventory. Hence, we can see that the second social division of labor occurred in Southern Turkmenistan and that intensive class formation was in progress.

In the Bronze Age, a livestock-herding population whose culture belonged to the group of the Steppe Eurasian cultures settled in close proximity to the Anau oases on the borders of the sands (Kuzmina 1963c).[1] Hand-made pottery with a geometrical incised pattern and applied roller clay ribs was found on the sites. These peoples came into contact with the Anau Culture, as indicated by findings of the analogous hand-made vessels and metalware typical of the Eurasian Steppe (e.g., a single-edged knife at Namazga-depe) at the Anau settlements studied.

The interrelations of the newly arrived livestock-herding population with the Anau aboriginals evidently were often hostile. At Tekkem-depe (Ganyalin 1956b), fire twice destroyed the late Namazga VI houses, and the site of the fire was occupied afterward by the Steppe peoples, who left their vessels on the site.

The necessity for defense against the pastoralists who advanced from the north is likely to have caused the construction of the defensive

walls around the Anau settlements and the spread of different types of offensive weapons.

In the twelfth century B.C., the Namazga VI Culture disappeared.[2]

The Culture of the Barbarian Occupation

The lowland plain in the twelfth to eighth centuries B.C. was the site of the development of the barbarian[3] occupation (Elken II), whose late Murghabian variant was the Yaz 1 complex. The levels of this period were studied in Anau (Pumpelly 1908) and at Elken-depe (Marushchenko 1959) and Yaz-depe (Masson 1959). This culture differs fundamentally from the previous Namazga stages, which are clearly related to one other.

The population lived in small settlements that clustered around large capitals, whose center was dominated by a grand citadel: Elken-depe on the lowland plain and Yaz-depe on the Murghab. Essential changes took place in house-building: the dwellings of ordinary people were small and badly laid out, while next to them, within the walls of the citadel, which rested on an eight-meter-tall brick platform, towered the ruler's palace, with a rectangular hall and narrow vaulted storage rooms (Yaz-depe).

In the period of barbarian occupation, the Southern Turkmenistan economy underwent considerable change: livestock-herding now had an important role. However, a gradual return to farming took place and, at the end of this stage, farming again became the staple mode of production. But by then there was already a new stage in Central Asia's economic development: small irrigation canals were superseded by a strongly organized irrigation system based on the use of water from the large rivers.

No less important were the changes in pottery production: the centuries-old wheel-made ware was all but lost: *humchas* (large storage vessels), bowls, and pots (sometimes handled) were formed by hand. Their surface was gray or light-slipped. A small portion of the vessels were decorated with geometrical ornamentation in the shape of triangles and rhombuses painted brown over a light greenish background.

Significant changes are also observed in metalworking (Fig. 39). The assortment of articles changed completely: there appeared single-edged knives and socketed two-bladed arrows, which were among the traditional forms of metallurgy in Central Asia and were unknown to the previous Anau population. Metal composition also changed: high-tin bronzes became widespread (analysis by I. V. Bogdanova-Berezovskaya in Kuzmina 1966); iron was brought into use, and the first iron tools were manufactured (a sickle in Anau).

Such considerable shifts in material culture can be explained partly by the intrusion of an alien population. The issue of where they came from remains disputable, for the ceramic complex of the barbarian occupation epoch does not have prototypes in the culture of the livestock-herding population of the Central Asian Steppe. However, the spread of livestock-herding, hand-made vessels, and, especially, metalware typical of the northern Steppe regions gives grounds to assume that the livestock-herding peoples played a significant role in the formation of the Elken II–Yaz 1 Culture (Pumpelly 1908; Marushchenko 1959; Ganyalin 1956b; Kuzmina 1963c).[4] This parallels the movement of different groups of the Steppe livestock-herding peoples from north to south, to the lowland plain, and in the direction of the Murghab, already recorded in the Namazga VI period.

In the Yaz-1 period, the newcomers gradually changed over to the settled farming economy and mastered the cultural achievements of the aboriginals. Coming into contact with the ancient farming population, the nomadic peoples of Central Asia acquired their production skills and advanced to a higher stage of economic development, which prepared for the efflorescence of Central Asian culture in the early Iron Age.

In the late Bronze Age fundamental changes occurred in the social system of the Southern Turkmenian peoples. It may be assumed that, as the productive forces grew, and the economic basis of Southern Turkmenistan strengthened, the chief was turning into the ruler, who took charge of the organization of production, controlled the mass of the people, and exercised military functions. The formation of an early chiefdom was emerging.

The complex irrigation systems and strong citadels, whose construction required great efforts of organized collective labor, archaeologically reflect the emergence of a centralized authority.

The Caspian Sea East Littoral

In the late second millennium B.C., throughout the westernmost parts of the Central Asian deserts, by the eastern shore of the Caspian Sea, and further to Turkmenistan, were certain settled peoples. The culture of these groups has been studied by A. M. Mandelshtam (1966) based upon materials from the Patma-Sai and Karalemata-Sai burial grounds in the vicinity of Bolshie Balkhany and Gazylgy-Kum and Parau 1 at the foot of Kopet Dagh to the west of Kyzyl-Arvat. The burial grounds consist of small groups of barrows with a stone mound (in one case a stone ring was recorded). In the center of the barrow there is a ditch grave with a stone ceiling and traces of fire. The deceased lie in flexed

position on their left sides with their heads oriented to the east. Coarseware and undecorated jar-shaped pots were found in the graves; only in two cases are the vessels decorated with zigzags or triangular indentations.

The orientation of the burials and the nature of the vessel assemblage suggest a connection between the people of these burials with the late Timber-Grave population of the Volga Region and, particularly, the Ural Region (there existed a contact zone) (Map 12). The materials from these burial grounds in Western Turkmenistan document the arrival of peoples from the North. The location of the sites in the dry desert also indicates that the peoples were nomadic pastoralists.

The Lower and Middle Part of Transoxiana

The Tazabagyab Culture

The culture of the population that inhabited the Aral Sea Littoral—the lower part of Transoxiana, known as the Tazabagyab Culture—in the Bronze Age, was studied by the Khorezm Expedition, which lasted for years (Tolstov 1948; 1962; Itina 1961; 1967). Excavations at the settlements of Angka 5 and Kavat 3 made it possible to identify the type of the Tazabagyab dwelling. It was a semi-subterranean dwelling, measuring 100–150 sq. m, with clay daub walls, a corridor-like entrance, and a heating hearth in the center. Sometimes there were support posts for the ceiling.

The materials from the Kokcha 3 burial ground give a precise idea of the funeral rite of the population. The cemetery obviously had no surface constructions, the burials took place in pit graves oriented to the West, the deceased lay in flexed position—men on their right, women on their left sides. Sometimes a man and woman or less often mother and child were buried in one grave.

Pots, awls with a bone handle, needles, channeled bracelets, temple-rings—oval or in the shape of the figure eight—and beads were put in the graves.

Just as in other regions of the Eurasian Steppe, the population was engaged chiefly in pastoralism. They raised cattle, sheep or goats, and horses. However, the favorable natural conditions of the delta and contacts with the farming population of Southern Central Asia led to an increase in the role of irrigation-based farming in the economy of the Tazabagyab Culture. Initially they constructed small banks, dividing the fields into the cells, 3–5 m on each side, and bringing water to the fields from the dammed channel.

In the late Bronze Age the irrigation system was improved: people

built small canals that could water fields measuring up to one hectare. The mastering of this irrigation technique was an important step for Central Asia's agriculture.

Pottery in Khorezm was shaped by hand. The vessels were jar- and pot-shaped, the latter richly decorated all over the upper part of the vessel or on the rim and the shoulder. Among the decorations were zigzags, herringbones, notches, isosceles and right triangles, and more complex compositions: meanders made up of hatched stripes, Z-figures, etc.

A particular group of the Tazabagyab population dwelt in the middle part of Transoxiana.[5] On the Makhan Darya, a dry channel in the delta of the Zeravshan, a number of scattered sites were found, including Guzhaili 9 and the Guzhaili burial ground (Gulyamov et al. 1966; Kuzmina 1968; 1994c).

The inhabitants of the Makhan Darya had the same funeral rites as the groups from the Aral Sea Littoral. In the burial ground (no burial mounds present), the deceased lay in flexed position on their sides placed in ditch graves oriented to the West. At their heads are vessels. The women are richly adorned, wearing pendants in the shape of figure-eights and bracelets similar to the Kokchin ones, and also numerous beads, including strings of colored stones imported from Southern Turkmenistan.

The pottery of Makhan Darya origin is perfectly analogous to the Tazabagyab vessels of Khorezm, with regard to both the jar- and pot-shaped flat-bottomed vessel type and the stamped ornament type, plain or indented. The patterns are found in two zones, on the rim and on the shoulders of the pot. Most often these are isosceles triangles, herringbones, or zigzags, and sometimes meander-like compositions.

Cattle, goat, and sheep bones were found at the settlements, and also slag, copper droplets, querns, pestles, and stone arrows, suggesting the economic activities of the Tazabagyab population of the Bukharian oasis.

The character of the Tazabagyab material culture (western orientation of skulls in burials, assortment of adornments, ornamental motifs on the pottery) suggests their proximity to the Western Andronovo tribes, particularly the population that dwelt in the vicinity of Orsk and Aktyubinsk and those that interacted with the Timber-Grave tribes of the Lower Volga.

Evidently, this similarity reflects the close relationship of these groups to the Eurasian Steppe population.[6] This is borne out also by anthropological data (Trofimova 1961): a major proportion of the corpses in the Kokcha III burial ground belong to a physical type similar to the population of the Volga Region and Eastern Kazakhstan (al-

though there is also a type that is related to the ancient population of Uzbekistan, Tajikistan, and India).

Graves of the late Srubna Culture have been investigated in the Tashkent Oasis in Yangiyul', Orekhovskoe, and Saraadach. The skeletons are oriented to the east or the north, and a pot without ornament was commonly found near the head. Burial grounds of the Andronovo Fedorovo type are also known. At Vrevskaya and Brichmulla they exhibit cremation accompanied by a richly ornamated pot, while at Aurachmat and Iskander they display inhumation with late Andronovo bracelets having protruding horns (Litvinsky 1962; 1963; Kuzmina 1966; 1994c).

In the middle Zerafshan valley near Samarkand the graves of mixed types prevail (Muminabad, Chakka, Siab). They display a combination of the Andronovo Fedorovo type and late Srubna features that demonstrate the penetration of different groups to this region.

The Suyargan Culture

According to S. P. Tolstov and M. A. Itina (1960), the Tazabagyab Culture coexisted in Khorezm with the Suyargan Culture.[7] This culture appeared in the first half of the second millennium B.C., developing out of the local Kelteminar Culture (Gulyamov et al. 1966),[8] which was influenced by southern farmers. In the latter half of the second millennium B.C., the Suyargan and Tazabagyab populations were in the process of active assimilation.

The Suyargan tribes inhabited oval dwellings with a post construction and a heating hearth (Djanbas 6). Their funeral rites are unknown. At the early stage, hunting and fishing were practiced, though later a food-producing economy developed.

Pottery was shaped by hand. The vessels were globular, their surfaces often covered with red slip, over which sometimes a geometrical pattern would be stamped or painted in black. During the early stage the stone industry was developed (knives and arrows); at the late stage metalworking was mastered, as apparent from the presence of single-edged knives, sickles, a hook, a ring, and an awl.

Ferghana

In the latter half of the second millennium B.C., the Ferghana Valley was inhabited by Steppe tribes of the Kairakum Culture, which in the late second millennium B.C. coexisted with people of the agricultural Chust Culture.

The Kairakum Culture

The Kairakum Culture was studied by B. A. Litvinsky (1962). In the sands along the bank of the Syr Darya, three groups of scattered settlements were discovered, measuring, as a rule, not over 3 ha each. The remains of the oval and circular stone hearths, sometimes arranged in a linear pattern, allow for the reconstruction of the shape of the dwellings. These were likely to have been rectangular and extended approximately 20 m in length (settlement N 16).

The Kairakum dead were buried in a flexed position on their sides, with their heads to the west, in cists (Khodji-Yagona), or in graves with the walls of stone slabs laid flat (Dakhana). It may be assumed that the burial grounds of Vuadil and Karamkul in the Southern Ferghana Valley belong to the same culture (Gamburg, Gorbunova 1956; 1957; Litvinsky 1963, 124). Here under the stone pavements or fences, rectangular or circular in form, burials oriented to the west were discovered in the graves with stone-laid walls. Double burials were found (Vuadil). In all the burial grounds of Ferghana, the deceased were accompanied with vessels and adornments (bracelets, trumpet-shaped earrings, beads); a bronze arrowhead was also found (Vuadil).

The materials obtained at the Kairakum sites give an idea of the economy. Of primary significance in the life of the Kairakum tribes was livestock-herding: horse, cow, and sheep or goat bones were found. Farming was practiced, as apparent from numerous querns. Hunting and fishing played a secondary role (evidence of flint arrows and a bronze hook). Impressions of fabrics found on vessels provide evidence for the practice of weaving.

Kairakum pottery was made by hand, often with the use of a fabric pattern. All the vessels are flat-bottomed and have rounded sides, in some cases with a flange, and rims of varied shapes. The outer surface is smoothed and sometimes covered with a simple geometrical decoration, often found only on the shoulder. Isosceles triangles, vertical herringbones, and zigzags make up the patterns executed with a plain or indented stamp.

One main occupation of the population at the Kairakum sites was metalworking. The ore was mined in the neighboring deposits of Naukat, in the Kara Mazar Mountains, and smelted in the immediate vicinity of the settlements: large accumulations of slag, pieces of ore, and copper droplets were found there. Metalware was manufactured at the settlements. At settlement N 16 stone molds used for manufacturing scalloped axes and picks were found.

The Kairakum people also used daggers and knives, arrows, and

awls. The tool types are similar to those found in Western Kazakhstan and Semirechye centers. This indicates a common trend in the development in metallurgy throughout the eastern regions of the Eurasian steppe. It also reflects the basic orientation of the cultural relations of the Kairakum population.

In addition, the inhabitants of the Kairakum sites maintained contacts with the neighboring Chust peoples of Ferghana (Chust vessels were found on the Kairakum sites and in the Tash-Kurgan burial ground), and some common types of metalware were also widespread.

The Chust Culture

The Chust peoples dwelt in the northern and eastern parts of the Ferghana Valley. Their culture was studied through the excavations in Chust (Sprishevsky 1957; 1963) and at Dalverzin (Zadneprovsky 1962); many other sites are also known.

Among the Chust settlements, small unfortified farms are found (Chimbai), but particularly typical are large villages: Chust occupies 4 ha, Dalverzin, over 10 ha. They are fortified with thick defensive walls faced with adobe. A few earthen houses made of adobe with small narrow rooms were discovered on the territory of the settlements, as were traces of light earthen dwellings, whose foundation consists of a pole framework. Inside the houses and nearby, numerous storage pits for grain were discovered, as well as hearths faced with pebbles or with pisé walls.

The dead were buried in the vicinity of the settlements in flexed positions on their sides or less frequently in supine positions on their backs; the orientation is varied. Dismembered skeletons and separate skulls are also discovered.

The Chust economy was based on farming. They cultivated wheat and barley and a special species of millet (these grains were identified at the Chust site). Stone hoes were used for tilling; the crop was reaped with stone and bronze sickles; the grain was ground by means of large stone querns and numerous pestles and grindstones. The existence of sedentary livestock-herding is apparent from the discovery of bones of cattle and sheep or goats, horses, donkeys, dogs, and pigs in the domestic setting. An insignificant role was played by fishing and hunting (a small number of hooks, fish, and *dzeren* bones were found).

Chust Culture pottery is hand-formed and includes corded ware and fabric-impressed vessels. Eighteen percent of the vessels are coarseware for cookery, made of gray clay, most shaped like cauldrons with a globular-shaped body, pots with a narrowed neck, and braziers. The rest of the vessels are thinner-walled and coated with a red slip on the outside. Pottery of this group is very diverse in shape: handled pots, conical vessels, varied plates and bowls, including those with a spout, are found. A small portion of the red-slip pottery is painted black with a geometrical pattern in the shape of contoured and hatched triangles, rhombuses, and bands. Also, several vessels have a streaky black burnish.

Metallurgy was based on the use of the ores from the nearby deposits (in Chust-Varzyk). Artifacts were manufactured at the settlements, where slag and a vessel with slag and stone molds were found. Tools include the socketed chisel, numerous sickles with a hole in the handle, specific single-edged knives, awls, and borers. Bits and cheek-pieces were also found. Among the weapon types were socketed spears, including those with incisions, and varied socketed and shafted arrows. The group of adornments and toilet artifacts consisted of handled mirrors, openwork pendants, etc.

One distinguishing feature of the Chust Culture was the preservation of an advanced stone and bone industry and a sophisticated level of weaving, as determined by the pottery impressions and discoveries of spindle whorls, a shuttle for a loom, etc.

As already mentioned, the Chust Culture tribes maintained contacts with the neighboring pastoral population. Interactions, it would appear, were far from peaceful, probably compelling them to erect strong defensive walls around their settlements.

The Chust Culture people undoubtedly also had cultural relations with other farming tribes, particularly those of Southern Turkmenistan. Some Chust vessel forms and decorative motifs (but not the range of colors!) have parallels in the ceramics from the barbarian occupation period, particularly Elken II (Marushchenko 1959).

The similarity of details of horse harness and mirrors from the Chust Culture with Necropolis B in Sialk-tepe (Ghirshman 1939) points to relations with Iran. Some parallels to the pottery and the construction of the fortified settlements of Chust and of the Painted Pottery Culture of Eastern Turkestan have also been determined (Kiselev 1960; Litvinsky 1963).

Particularly notable is the similarity of certain vessel forms and decorative patterns with the ceramics of Central India (Zadneprovsky 1962) and the earlier complex of Mundigak V in Afghanistan (Fig. 42). Some researchers explain this as the migration of the Aryan population from Central Asia (Casal 1961).

The genesis of the Chust Culture remains unclear. One can tentatively assume that a part of the local Steppe population of Central Asia in the mid-second millennium B.C. adapted to farming as a result of influence from Southern Turkmenistan tribes. Then one group appar-

ently migrated to Afghanistan, becoming essential in the development of the Mundigak V complex, while another group settled in Central Asia, including the Ferghana Valley, giving rise to the Chust Culture (Zadneprovsky 1962; 1966).

Kirghizstan

The Andronovo Culture

Northeastern Central Asia, the territory of present-day Kirghizstan, in the latter half of the second to the early first millennium B.C. was inhabited by diverse peoples that belonged to the Andronovo Cultural Community.

The cultures of two different population groups is known through the burial ground near the city of Frunze (Bishkek) (Kozhemyako 1960) and the Arpa burial ground (Bernshtam 1952). In the first case, western-oriented burial inhumations were discovered. In the Central Tian Shan different burial practices existed: in the Arpa burial ground cremations were performed in stone enclosures.

Both variants of the funeral ceremony, and also vessels with a rich geometrical ornament and adornments found in the graves (a bracelet, beads, a temple-ring), are similar at different types of Andronovo sites in the central and eastern regions of Kazakhstan.

The Semirechye Type of Andronovo Culture

In a portion of the territory of Kirghizstan, a peculiar culture known from the burial grounds of Tash-tyube II, Tash-Bashat, Teghirmen-Sai, Dzhazy-Kechu, Karakmat, Dzhal-azyk, Kulan-Sai, Chon-Kemin, and other sites was found (Kozhemyako 1960; Abetekov 1963; Kibirov, Kozhemyako 1956; Galochkina 1977; Kozhomberdyev, Galochkina 1977; Kuzmina 1970; 1994c; Gorbunova 1995).

Here, in long rectangular enclosures and under stone pavements in ditches oriented to the west, graves daubed with clay or faced with stone, burials of cremations, or sometimes, inhumations, were performed (Fig. 28). Rich sets of adornments (bracelets, trumpet-shaped rings, strings, casings, and beads, including 1,200 beads of antimony in a single burial) and vessel forms of typical Andronovo pottery were found in the graves. The vessels were flat-bottomed, often with a flange on the shoulder but, as a rule, undecorated or merely poorly decorated with zigzags. The similarity of the Talas burial grounds with those of the Kara-Kuduk type in southern Kazakhstan indicates that, within the Andronovo community, there existed a separate Semirechye type (Kuzmina 1966; 1970).

Very close to the Semirechye type are the burial grounds of Southern Ferghana: Vuadil', Karamkul', Yapagi, Arsif, and Uruksur (Gamburg, Gorbunova 1956; 1957).

The monuments situated in the Tian Shan form a special group: the settlements Talapty, Turgen' I, II, Uzunbulak and Asy, and the burial grounds Kul'sai, Uzunbulak, Kyzylbulak I, II, Tamgaly I-VI (Maryashev, Goryachev 1999; Rogozhinskii 1999).

The dynamics of the development from pastoralism to a nomadic economy may be discovered here. It is essential to observe that the connection between the archaeological monuments and nearby petroglyphs is firmly fixed at these sites. This affords the possibility to establish the chronology of Tamgaly (Maryashev, Goryachev 1998; Rogozhinskii 1999) and other Andronovo monuments of art, for instance the petroglyphs at Saimalytash (Martynov et al. 1992; Tashbaeva 1999).

The types of settlements and dwellings of different tribal groups that settled in Kirghizstan in the latter half of the second millennium B.C. have not yet been studied. Traces of sites were recorded only in the city of Frunze (Bishkek), in Dzal-Aryk, in the town of Osh (Zadneprovsky 1997), and at the Big Chust Canal (Archives of Leningradskoe Otdelenie Instituta Arkheologii [Leningrad Branch of the Archaeological Institute] 1941). Pottery with applied rolled decoration is also found at these sites.

The economy of this region's population was founded on livestock-herding. The location of the Arpa burial ground in the Tian Shan Mountains, at a height of 2,800 m, enables one to assume the establishment of transhumant pastoralism. The spread of farming and the storing of forage for the winter are indicated by a large quantity of sickles. Mining and metalworking were undoubtedly of great importance to the life of Kirghizstan's peoples. In the vicinity of Lake Issyk Kul, at Chatkal, in the Talas Ala Tau, ancient mines are known, whose origins began as far back as the Bronze Age (Surgai 1951).

A large number of chance finds of metalware and hoards come from Kirghizstan: Sukuluk I, II, Sadovoe, Karakol, Tyup, Shamshi, Tuyuk, and Issyk Kul (Bernshtam 1941; Zimma 1948; Kibirov, Kozhemyako 1956; Kuzmina 1961; 1965; 1966; 1994c) (Figs. 50–54). Their chemical composition points to the use of local ores.

A large independent metallurgical center, whose activity became particularly intensive in the late Bronze Age, originated in the territory of Kirghizstan (Kuzmina 1966), as indicated by the discovery of a foundry hoard and molds. Scalloped axes, picks, celt-spades, sickles of the Sosnovo-Mezinsk and other types, and single-edged knives were manufactured in Kirghizstan. The similarity of the shape of these artifacts and their assemblages to the Eastern Kazakhstanian bronzes testifies to the

single cultural development of the Andronovo populations of Kirghizstan and Central and Eastern Kazakhstan.

That Semirechye sustained cultural relations with some remote eastern regions (China) is indicated by the spread of specific types of celts and other implements.

The Southern Part of Transoxiana: The Bishkent Culture

The genesis of the Bronze Age cultures in the southern part of Transoxiana appears to be very complex, as the following brief discussion of each culture demonstrates.

The Bishkent Culture was studied by A. M. Mandelshtam (1959; 1966). At the Tulkhar burial ground, the first site of this culture to be studied, the stages of its development were established. The stratigraphically oldest group (I) in the burial ground is constituted of cremation burials in the northern-oriented ditch graves, on the bottom of which a swastika design or a spoked circle is laid with stones. Group II consists of burials in flexed position (sometimes double male-female ones), with variable orientation, in pit graves with a shallow ramp-dromos.[9] (There are also some burials in cists.) Fire played an important role in the funeral rite: next to each female burial there is invariably a circular hearth, next to the male burials, rectangular ones.

Pottery was found in the graves (Fig. 36). It is chiefly hand-formed; there are cylindrical vessels, basins, and pots with a low narrow neck and a globular body. This group of vessels has prototypes and analogies to the materials of the much earlier burial ground of Zaman-Baba. Imported vessels made on a fast rotation potter's wheel were also found: plates with complexly contoured rims and globular pots. Forms of the wheel-made ware are comparable to the pottery found at the sites of Southern Turkmenistan of the Namazga VI period and in level VI of Mundigak (Casal 1961).

Metalware found in the type II burials of the Tulkhar burial ground shows that the Bishkent Culture emerged from the Steppe cultures of Central Asia and experienced different influences: the dagger with an isolated handle is typical of the Eastern Andronovo tribes, the form of the mirror and the spade-shaped pins goes back to the Zaman-Baba ones; the razors and bispiral pins and the handled mirror are traditional items found in Southern Turkmenistan, Iran, and Western Asia (Figs. 37, 39).

Level III, stratigraphically the latest group in the Tulkhar burial ground, is made up of single northern-oriented burials in flexed position placed in catacombs with a perpendicular stepped dromos. Such catacomb burials were discovered in the burial grounds of Tupkhana, near Dushanbe and also in Kyzyl-Su and Vakhsh. B. A. Litvinsky (1964) regards the latter as a peculiar Vakhsh Culture.

The sites of Vakhsh culture are very numerous now and well analyzed (Pyankova 1989; Vinogradova 2004; ITN 1998), which frees me from having to make a detailed interpretation of this topic (Map 13).

Shafted-stone arrowheads, bronze pins, and stone beads were found in the catacombs. Pottery is represented by pear- and egg-shaped pots on a circular base, tall cylindrical vessels, etc., that, in some measure, can be correlated with the pottery of the late Bronze Age in Southern Turkmenistan. B. A. Litvinsky sees similarities in the Vakhsh materials to those of the Djangar Culture in India.

The location of the Tulkhar burial ground, situated in the semidesert stony valley, along with the discovery of sheep/ram bones in the burials, indicate the pastoral character of the Bishkent Culture's economy.

The parallels drawn by A. M. Mandelshtam allowed him tentatively to date the burial ground to the late Bronze Age and to assume that the population originated from the pastoral population of the Central Asian Steppe; it is possible that their ancestors were related to the Zaman-Babians and maintained contacts with the tribes of the Andronovo Cultural Community. This is indicated by the spread of the rite of cremation and the horse cult.

Many details of the burial practices found at the Tulkhar and other Bishkent burial grounds (inhumation, the construction of rectangular and circular hearths, the swastika, and the solar sign) have immediate and indisputable analogies in the burial practices of India's Aryans, as depicted in the Vedic texts (Fig. 38). The data obtained from the excavations of the burial grounds in Swat, in Western Pakistan (Stacul 1966), also enables one to detect some affinity in the archaeological material. This gives reason to hope that the materials of the southern region of Transoxiana will be of fundamental significance in solving the issue of the routes and time of the Dards, Nuristani, and Vedic Aryans' migration to India. Especially interesting is the early necropolis of Kherai in Swat.

Along with the Bishkent Culture, the southern part of Transoxiana was populated by other livestock-herding tribes, whose culture is known through the excavations in the Aruktau burial ground (Mandelshtam 1966).

Finally, we have reason to believe that farmers occupied the fertile valleys of the Amu Darya in the latter half of the second millennium B.C. (Figs. 41–44). The existence of the settled farming culture, close to Namazga VI in terms of the level of development, is indicated by the finds of wheel-made pottery in the Tulkhar burial ground. In the

late Bronze Age a farming culture known through L. I. Albaum's excavations of the settlement of Kuchuk-tepe and, evidently, related to the Yaz 1, existed in the vicinity of Termez (Askarov, Al'baum 1979) and Talashkan. This pottery, especially pieces made with an applied roller, has analogies in places as far as Turkmenistan, Shortughai, Pirak, Mundigak, and some settlements in Baluchistan.

An assemblage of pottery with applied rolled decoration was discovered in the large Bactrian settlement at Dzharkutan (Askarov, Shirinov 1993). The same handmade pottery with applied roller decoration is also found further south in the Zhob Valley in Baluchistan (Fairservis 1957), in the Kandagar Valley in Mundigak V, VI (Casal 1961), and in the Kachi Valley in the settlement at Pirak where bones and figures of horses and camels were recovered (Jarrige, Santoni 1979). In the southern Indus Valley, pottery with applied rolled decoration was discovered at Tulamba, Dur-Khan, and Patami-Damb (Franke-Vogt 2001), usually in complexes with painted pottery.

In the latter half of the second millennium B.C., cultures belonging to three different economic and cultural types existed in Central Asia.

1. In the South, the Anau Culture continued to develop, and its people emerged as a complex economy and society. Their economy was based on irrigation farming; craft specialization occurred; and intensive social stratification was well under way.

2. In a few regions, cultures with economies based on farming and domesticated livestock-herding existed. These peoples apparently belonged to the indigenous population of Central Asia, and their transition to farming is likely to have been caused by the cultural impulse from the south (it is possible that parts of the ancient farming population infiltrated northward). At present this cultural and economic type is known only by the sites of the late Bronze Age (Kuchuk-tepe, Chust).

3. A major part of Central Asia was occupied by groups whose economy was based on pastoral[10] livestock-herding, though in some areas a transition to nomadic livestock-herding was already beginning to materialize (Kirghizstan), while in others, on the contrary, pastoral tribes set about mastering irrigation farming (Khorezm).

Central Asia's pastoral peoples can tentatively be divided into four main groups associated with the following quadrants: (1) the eastern, Kirghizstan and Ferghana, which was populated by the peoples of what is now Central and Eastern Kazakhstan; (2) the central and northern part of Transoxiana, which was inhabited by the Tazabagyab peoples related to the Andronovo peoples of Western Kazakhstan and the Ural region; (3) the westernmost part, the Caspian Sea Littoral, that saw the pastoral population, related to the Timber-Grave Culture representatives of the Volga Region, moving from north to south; and (4) Southern Transoxiana, where various populations succeeded one another and were related to the ancient indigenes of Central Asia who had been pushed southward by peoples of the Timber-Grave–Andronovo group.

The pastoral tribes of Central Asia lived under conditions of a primitive communal system, which is indicated by the character of the large houses thought to be the dwellings of extended-family groups and by the uniformity of the funerary inventory in the burials.

In the late Bronze Age the development of livestock-herding led to the accumulation of riches—cattle and metal—in the hands of separate families. The distribution of different types of offensive weapons and the burying of hoards in the late Bronze Age must have come about as a result of the intensification of clashes over cattle and pastures and the beginning of migrations of certain groups.

Chapter 5

Relations Between Eastern and Western Central Asia

> *The Tarym, overcome by the desert, exhausted, forms with its last waters an extensive reedy swamp, the present-day Kara-Koshuk-Kul, Przhevalski's Lob-Nor–and Lob-Nor at the time of the Khans. . . . Further on comes the desert of Lob: a stony plain, tiers of clay precipices, glassy salt ponds. . . . In this desert are preserved traces of an ancient road along which Marco Polo passed six centuries before I did: its markers are piles of stones. . . . In the desert during the sandstorms I also saw and heard the same as Marco Polo: "the whisper of spirits calling you aside" and the queer flicker of the air, an endless progression of whirlwinds, caravans and armies of phantoms coming to meet you, thousands of spectral faces.*
>
> *V. Nabokov,* The Gift

Contacts of the Xinjiang People with the West in the Copper Age, and the Tocharian Question

The interrelation of China with the Eurasian Steppe is of fundamental importance for understanding the emergence of civilization in China. Chinese archaeologists advocate the hypothesis that there was an autochthonous development of Chinese culture. However, most European and American researchers believe that the brilliant progress of the Chinese civilization in the Yin (Shang) period was premised on the appearance of three major innovations: wheeled transport, the horse, and metallurgy, which spread under the influence of the western impetus. This hypothesis was advanced by M. Loehr (1949b; 1956) and S. V. Kiselev (1960) and is supported today by many scholars (Lin 1986; Fitzgerald-Huber 1995; Linduff 1994; 1995; 1998; Mei, Shell 1998; 1999).

Evaluating arguments of both sides is beyond my expertise. But it should be emphasized that all the three innovations are already found in Anyang, which suggests a centuries-old prior development, not yet established in China. The linguistic data corroborates other evidence for the western origin of the horse and wheeled transport (Shaughnessy 1988; Janhunen 1998; Lubotsky 1998).

Research into Steppe contacts is also important for solving the question of the origin of the Tocharians. Linguists who have studied the Tocharian language and the Indo-European issue proved that the two varieties known as A and B belonged to the Indo-European family and established the early separation of the Proto-Tocharian language (V. V. Ivanov 1985; *Tokharskie yazyki* (The Tocharian languages) 1959; Sieg, Siegling 1931; Pedersen 1941; W. Krause 1952; Windekens 1976; Pulleyblank 1996; Winter 1998; Mallory 1998; Mallory, Mair 2000; Mair 2005).

However, the time of the arrival of the Tocharians in Eastern Turkestan from their original homeland is unknown. Judging from the written monuments, Tocharian B remained a spoken language in the fifth-tenth centuries A.D., when Tocharian A had already become the dead language of religious texts. That the Tocharian lexemes in the Indian texts written in Prakrits date back to the beginning of our era serves as the *terminus ante quem* of the arrival of the Tocharians in Xinjiang.

The route of the Tocharians from west to east across the Steppe can be argued for by the presence of apparently Tocharian elements in Finno-Ugric languages, whose speakers in the second millennium B.C. dwelt in the south of the Eurasian forest zone. Later contacts of Tocharian with East Iranian languages that spread in the Steppe and Central Asia have been traced.

In addressing these issues, the analysis of the archaeological material of Xinjiang is of pivotal importance. Archaeological research into the early sites in Eastern Turkestan was started in the first half of the twentieth century by A. Stein and Huang Wenbi (Stein 1921, 356–57; 1928, 1: 183–84, 205–6; Huang 1948; Bergman 1935; 1939). It was confined to gathering items from chance finds, which remained unsystematized and undated. Since the 1950s, the Group for the Protection and Study of the Monuments of the Material Culture of Xinjiang has begun systematic research on a vast territory. However, stratified sites in Xinjiang are scarce, and the dates established by ^{14}C vary greatly. This has impeded the creation of a chronological sequence of Xinjiang cultures and the interpretation of the historical process, leading some of the researchers to conclude that the region was lagging in cultural development.

A fundamentally new stage in the study of Xinjiang culture began with the discovery of the cemeteries in which unique burials of mummified people of the Caucasoid anthropological type were found. Such burials were first discovered near Lop Nor by Aurel Stein (1928, 1: 264–66; Bergman 1939); Huang Wenbi recognized the deceased as Saka (Wang 1987, 42). Later, burial grounds with mummies were detected in other areas of Xinjiang (Hadingham 1994, 68–77; Kamberi

1994, 1–15; Mair 1995a, 281–307; 1995b, 28–35; Bower 1995, 120–25; Mallory, Mair 2000; Mair 2005). Excavations of the settlements are also under way.

To aid their interpretation, attempts were made to classify the materials, published by Chinese researchers, on the basis of the analogies with Central Asia and Siberia. These were made by E. V. Antonova (1988, 136–55); C. Debaine-Francfort (1988, 5–26; 1989, 183–213); K. Jettmar (1985a, 146–62; 1992, 141–44); E. E. Kuzmina (1992, 43–45; 1995, 241–42; 1998a, 63–93); Khavrin (1992, 141–44); K. Chen and F. Hiebert (Chen, Hiebert 1995, 243–300); E. C. Bunker (1998, 604–11); and D. Mei (Mei, Shell 1998; 1999; Khudyakov, Komissarov 2002). The painted pottery of the Chust Culture in Ferghana found at the sites of Xinjiang was analyzed by Yu. A. Zadneprovsky (1962, 67, 106, 107; 1994, 18–19; 1995, 15–18). He was also the first to notice the similarity of the censer and vessels from the early levels of the chronologically mixed Keremchi burial ground near the Russian border with the pottery of Siberia's Afanasievo Culture (Zadneprovsky 1992; 1993; 1995), which was later substantiated in work by V. A. Semenov (1993a, 26), V. I. Molodin, and S. V. Alkin (1997, 38).

A group of scholars from Novosibirsk headed by V. I. Molodin (Molodin, Alkin 1997; Komissarov 1997; Varenov 1998a; Khudyakov, Komissarov 2002) has embarked on a systematic study of Xinjiang materials and their similarity to Siberian materials. It is perfectly reasonable to expect that this investigation will result in the chronological and cultural association of Eastern Turkestan cultures with Siberian cultures and also will provide a solution to vital questions concerning their origins.

Chinese researchers also seek to classify Xinjiang's materials. An Zhimin (1998), followed by Shui Tao (1998) and K. Chen and F. Hiebert (1995), singled out the local cultures in Xinjiang, the sites within which are characterized by proximity: (1) the area to the east of the Tarim; (2) Hami (the Yanbulaq Culture); (3) Turfan; (4) the Tian Shan mountains near Ürümchi (the Alagou complex); (5) the Cismongolian Steppe (the Nanwan burial ground, et al.); (6) the Altaian Steppe to the south of the Russian border (the Keremchi burial ground); (7) the valley of the Ili river to the east of the Kazakhstan border; (8) the high mountains of the Pamirs to the east of Tajikistan; and (9) the Kunlun mountains.

Unfortunately, An Zhimin failed to work out a chronology of the complexes and thus to establish their cultural relations with the sites from the adjoining territories. If he had done so, it would be possible to establish the origins of Xinjiang culture and to determine the cultures' correlation with the craniological series. Thus, S. A. Komissarov (1997, 40) is right to conclude that today "one cannot speak of a single culture (or even of the interrelated complex of cultures) of Xinjiang in the Bronze Age, nor can one establish a uniform scheme of their development."

The work by J. P. Mallory and V. Mair published in the year 2000 was a great event in the research into the history of Xinjiang. The authors succeeded in gathering and systematizing all the available archaeological materials and comparing them to data from written textual sources and linguistics. This complicated analysis allowed them to reconstruct for the first time the dynamics of the historical processes in Xinjiang, focusing their attention on the ethnogenesis, or local development of cultures.

The work by the leading Chinese physical anthropologist Han Kangxin (1994; 1998, fig. 1) is an essential contribution to the study of Xinjiang cultures. He analyzed 300 skulls assigned to the period from 1800 B.C. to A.D. 300 and demonstrated that the oldest skulls in the series, those of the Gumugou burial ground (1800 B.C.), belonged to the Caucasoid type, which had a western origin and remained there to a much later time, being present in the area of Hami in the Yanbulaq burial ground (dated by ^{14}C to 1300–500 B.C.), and in later sites (Khotunsumbul, Alwighul, Miran). In the late Bronze Age and the early Iron Age, the arrival of a second population, also Caucasoid and Western by origin, is recorded. It belonged to the East Mediterranean type, similar to the Saka of the Pamirs; it is represented at the Tashkurgan burial ground in the Pamir Region. In the Saka and Classical period this anthropological type is also represented in southwestern Xinjiang (the Sampul burial ground) and further to the east up to Lop Nor (the Miran and Krorän [Loulan] burial grounds), and to the north (Alwighul). Finally, in the Saka epoch, the presence of a third group of Caucasoids is noted. These were people of the Pamiro-Ferghanian type characteristic of the Saka of Kazakhstan and Central Asia and represented in Xinjiang by the skulls from the burial grounds of Alwighul (sixth to first centuries B.C.) in Turfan and Mongghul Kürä (first century A.D.) at the border of Semirechye, etc.

Thus, Han Kangxin concludes (1998, 566–68) that in the early Bronze Age the area of Lop Nor was penetrated from the west by a population similar to that of Central Asia (including Kazakhstan), Southern Siberia, and the Volga Basin, up to the Don Region, a people that goes back directly to the Cro-Magnon men of Paleolithic Eastern Europe. Further, the same route from west to east was taken by representatives of the Mediterranean and Pamiro-Ferghanian types. Consequently, the ancient opening of "the Silk Road" was made by the migration of the Caucasoid population eastward to Xinjiang. As for the

Mongoloids, their penetration from the east into Eastern Xinjiang by small groups is noted only from the third century B.C. and is linked with the migration westward of the Huns and Turks, a conclusion corroborated by the evidence of the Han written sources.

Han Kangxin's work is of great importance for the reconstruction of ethnogenesis in Xinjiang and the interpretation of the archeological material, which can be comprehended only when considered in light of materials from the adjacent regions of Siberia, Kazakhstan, and Central Asia.

Some Chinese archaeologists have already made attempts in this direction. Shui Tao (1998) analyzed the materials of the Charwighul burial ground in the northeast of the Tarim Basin, which included about one thousand burials and in which painted pottery was found that is comparable with vessels from the area of Turfan. The author compares this ceramic assemblage with the Chust Culture of Ferghana and the Vakhsh Culture of Tajikistan, and comes to the conclusion that the material culture of Ferghana of the Bronze Age is "closely related to the relics of the Bronze Age from the Tarim Basin" and that the cultural relations between the west and the east were established in the Bronze Age "long before the time of the Silk Road" (Shui 1998, 167, 168). (Unfortunately, I have not been able to gain access to Shui Tao's work "The Comparative Study of Xinjiang Cultures of the Bronze Age with a Discussion on the Process of the Early Cultural Interchange between the East and the West," published in Chinese in *Studies of Sinology* [1993, 1, 447–90], where he examined in detail the materials of Xinjiang and Chust, which formed the basis for his conclusions in 1998.)

Ke Peng (1998) compared the complex of the Aga'ersen (Toquztara) hoard with Andronovo bronzes. Unfortunately, he drew his conclusions solely on the basis of the works in English by V. M. Masson, V. I. Sarianidi, and E. N. Chernykh (1992), which led him to the correct conclusion concerning the western origins of the artifacts of this hoard but to their wrong chronological placement,1500–1000 B.C., and thus, to erroneous historical reasoning.

Thus, the task is to examine the sites of Eastern Turkestan near Lop Nor discovered in 1979 and studied by Wang (*Kaogu* 1982, 662; 1983, 658; 1986, 361–84; Debaine-Francfort 1988, 15–16; Kuchera 1988, 3–14; Jettmar 1992, 141; Molodin, Alkin 1997, 35–38; Han Kangxin 1994, 1–9; 1998, 558–72; Mallory, Mair 2000; Khudyakov, Komissarov 2002) (Map 15). Graves were excavated in the sandy ground of the second terrace over the flood plain of the Könchi Darya. Each has timber-faced walls and a timber-and-hide ceiling; each contains one burial (one burial is double and one is triple). Some burials are marked on the surface by vertical poles. One grave is enclosed by seven circles formed by wooden logs dug into the earth.[1] The dead lie in supine position on their backs, head to the east. Due to the dry climate, tapered felt caps, leather boots, and woolen fabrics were preserved. There is a small bag with twigs of ephedra put in it. Also in the graves were found wooden dishes and a wooden staff, wooden vessels, the remains of pure copper metalware, including a ringlet, bone and jade tubular beads, bone pins, a bifaced arrow with a bulrush shaft, and stone and wooden anthropomorphic figurines. Grains of two varieties of grasses were found (including wheat), as well as horns and bones of the sacrificed domestic animals: goat, sheep, cattle, and camel, besides those of wild animals: deer, moufflon, and birds.

The data thus indicate an economy based upon a complex of farming and livestock herding with some hunting. The burial inventories are the same for most individuals, pointing to the absence of social differentiation.

The chronology of the burial ground has aroused disagreement among sinologists. The dating ranges from as early as 4000 B.C. to as late as the Han period. The radiocarbon dates vary greatly, but if the two extremes are not counted, six dates fall within the range of 1710–1535 B.C. (or 2030–1815 B.C. when calibrated).

Han Kangxin studied eighteen skulls from the burial ground. All of them belong to the Caucasoid type. Initially the Chinese researcher divided the burials into two groups: the more ancient were in graves without timber constructions, with dolichocephalic skulls; there were two cases of more recent burials, from the circular fence, in which mesocephalic skulls were found. On the basis of V. P. Alekseev's (1961) classification, Han Kangxin compared the first group with the skulls of Siberia's Afanasievo Culture, the second with the skulls of the Andronovo Culture.

V. P. Alekseev (1992, 389–94) showed that the Caucasoid complex of characteristics in the Copper and Bronze ages was typical of the population of Western Siberia, Tuva, Mongolia, and Eastern Turkestan. The eastern border of the Caucasoid settlement was formed by the Nan Shan and Altyn Tag mountains, and Tibet was the native territory of the Mongoloid peoples.

As far as the craniological series of Gumugou is concerned, V. P. Alekseev emphasized that it undoubtedly belonged to the Proto-Caucasoid complex, but that it was impossible to differentiate between the Andronovo and Afanasievo skulls. In recent publications Han Kangxin (Han Kangxin 1994, 2, fig. 1; 1998, fig. 1) admitted "the homogeneity of the individuals" and assigned all of them to the Proto-Caucasoid type, characteristic of the "Bronze Age population of Southern Siberia,

Kazakhstan and Central Asia, and even the Steppe of the Volga Region," but noted that they were more primitive than the skulls of Gumugou (Han Kangxin 1998, 567).

What is the cultural and ethnic origin of the population buried at Gumugou? (Fig. 45). The absence of ceramics—the principal sign determining a culture—makes it impossible to give a conclusive answer to the question. Analysis of the clothing, which has analogies in the complex of Saka clothes, particularly in Pazyryk, led Wang Binghua (1987, 42) to the conclusion that they are related to the Saka Culture. C. Debaine-Francfort (1988, 15) correctly assigned the site to the Bronze Age. E. E. Kuzmina (1994c, 241) showed that the clothing represented in Gumugou was characteristic of the population of the Eurasian Steppe. The Andronovo costume consisted of a caftan, trousers, boots, hats, and tapered caps. The clothes were manufactured of felt, leather, and fur; woolen fabrics of calico and twill weave were also known (Sosnovsky 1934, 92–94; Maksimenkov 1978, 14, 72; Glushkova 1992, 118–19; Kuzmina 1994c, 156–62). They are analogous to the fabrics of Bronze Age Eastern Europe and Denmark. The same weaving technique was established in Xinjiang (Barber 1995; 1998; Good 1995; Mair 1995a, b). This is essential, since the lexicon associated with weaving is part of the most ancient Indo-European legacy (Gamkrelidze, Ivanov 1984, 383). This system of dress was formed in the Copper Age: leather boots and a felt hat were discovered in the burials of the Pit-Grave Culture. Representations of the tapered caps are familiar at the sites of Siberian art, which are assigned to the Afanasievo Culture (Lipsky 1961, 276–77).

The features of the Gumugou funeral rite have analogies in the group of the Eurasian Steppe cultures. The construction of the circular fences, including concentric ones, is known in the Pit-Grave, Afanasievo, and Andronovo cultures. Graves with timber or, more rarely, stone roofing, reed, birch-bark or felt mats, and sacrifices of the head and legs of domestic animals, are characteristic of these cultures.

However, the specific features of the Gumugou funeral rite can be identified not so much with the Andronovo as with the Afanasievo culture. Typical of Andronovo is the burial of the deceased in flexed position on their left sides with the heads to the west. In Afanasievo burials, the supine position of the skeletons, often with the knees raised, is usual. The western orientation of the burials occurs at some sites, in others, the eastern orientation of burials is evident, particularly in the Altai (the Kuyum burial ground). S. V. Tsyb considers the eastern orientation to be an earlier form. The fences are circular, and in the Altai they are often concentric, having two rings made up of stones

laid flat or of vertically dug-in slabs, or of logs (the Kurota burial ground) (Kiselev 1949, 14–40, pls. III-VI; Gryaznov, Vadetskaya 1968, 159–65; Vadetskaya 1986, 16; Tsyb 1980; 1984; Savinov 1994, 130–35).

Of great importance to the chronological and cultural attribution of Gumugou are the finds of metal artifacts, forged of pure copper, which is characteristic of Afanasievo, where infrequently sheet knives, awls, a spear, bracelets, and earrings are known, whereas with Andronovo metalware made of tinned bronze is prevalent. Other implements from Gumugou also have analogies to the Afanasievo sites. These are wooden vessels, a copper ringlet, a stone arrow, bone and jade beads, needles, awls, shovels, stone and wooden staffs, and a shroud (of birch-bark rather than felt).

The Afanasievo economy is complex, combining farming, livestock husbandry, and hunting. In the graves were found bones of cattle, sheep, horses,[2] and wild animals: the European bison, the deer, the wild goat, the musk-deer, the fox, and birds—including the golden eagle. The Afanasievo fauna correspond to those found in Gumugou.

Gumugou's peculiarity is its deposits of camel bones. The two-humped Bactrian camel (*Camelus bactrianus*) was domesticated in Southern Turkmenistan in the third millennium B.C. and used for harnessing to solid-wheeled freight vehicles (Kuzmina 1983, 96–142). Later it spread into Uzbekistan and Kazakhstan, as evidenced by representations on petroglyphs. The oldest findings of camel bones at settlements, ritual burials, and representations in plastic art are known in the Andronovo Culture, but there is also questionable evidence for finds of camel bones at Afanasievo sites (Kuzmina 1963a, 38–46; 1994c, 203).

Another peculiarity of the osteological materials is the absence of horse bones. Horses, however, are present in other burial grounds of Xinjiang; the finding of a solid wheel made up of three parts is also familiar (Mair 1995a, b). Such vehicle wheels are numerous at the sites of the Pit-Grave Culture (Piggott 1983; Kuzmina 1983; 1994c; Häusler 1981; Kozhin 1987; Izbitser 1993) and, judging by the representations, vehicles with solid wheels were known in the Afanasievo Culture (Leontiev 1980, 65–84).

These facts allow one to voice a hypothesis that the Gumugou burial ground should be assigned to the Afanasievo Culture. However, the absence of graves of stone construction, ocher, and ceramics still leaves doubt as to whether the hypothesis is fully validated, as is emphasized by V. I. Molodin and S. V. Alkin (1997, 38).

However, Xinjiang has indisputable sites of the Afanasievo Culture: the Tuqiu burial ground in the area of Ürümchi and Keremchi in the Altai district at the border with the Russian Altai, where Afanasievo

pottery was found (Zadneprovsky 1992; 1993; Molodin, Alkin 1997). A. V. Varenov's (1998b) skepticism as to the interpretation of this burial complex seems decidedly unfounded.

The probable similarity with Afanasievo ceramics of hand-formed pottery with geometrical decoration applied with a toothed stamp, as in A. Stein's collection from the Yarkand Darya (Kiselev 1949, 36; Antonova 1988, 150), has been noted many times. A collection from Xinjiang is kept at the Museum of Anthropology and Ethnography in St. Petersburg, but the ceramic fragments are not sufficiently demonstrative. Another notable find in the Afanasievo burial ground of Tes' are red-painted censers and a vessel with decorations of steps edged with triangles and painted white (Kiselev 1949, 20, pl. III, 28). However I am unaware of any examples of this motif found among the painted pottery of either Eastern Turkestan or China.

If the hypothesis that the Afanasievo population participated in the origins and development of the Xinjiang cultures can be verified in the future, essential issues central to the emergence of Chinese civilization and other problems of ethnogenesis in the Old World could be solved.

K. Jettmar (1992, 141) compared the materials of Gumugou with materials from the Small River Cemetery no. 5 (Bergman 1939, 61–99; Mair 2006), where graves were discovered that had timber walls and ceilings, fences of wooden pales, and anthropomorphic statues. The skulls of the Caucasoid type, the clothing, and the presence of ephedra are also analogous. Grains of grasses were found (millet, barley). Therefore, K. Jettmar recognized this population as Tocharian.

J. Mallory (1995, 379–82; 1998, 189) and, later, V. Mair (Mallory, Mair 2000; Mair 2005) put forward a hypothesis that the Afanasievo Culture populations were related to the Tocharians, noting the presence in the Tocharian language of the Indo-European terms connected with farming, livestock herding, and wheeled transport, which date back to the third millennium B.C. and have archaeological equivalents in the Afanasievo Culture.

E. Pulleyblank (1996) focused on the ancient Indo-European loanwords found in Sinitic, i.e., Chinese (wheat, barley, horse, wheel, vehicle [chariot], shepherd) and culture (the rite of the sacrifice of domestic cattle, sheep, and horse) and linked them with Tocharian influence. He acknowledged that the elements of Afanasievo Culture found at Gumugou may be representative of the most ancient Tocharians.

A. Lubotsky (1998) showed the Tocharian origin of the terms associated with transport in the Chinese language, while J. Janhunen (1998) proved that the name of the horse in all of the languages of Central and Eastern Asia was borrowed from a single Western language.

C. Renfrew (1998), proceeding from his hypothesis regarding the origin of the Indo-Europeans, put forward a bold proposal that there existed "an ancient Steppe Indo-European group" that united the Proto-Indo-Iranians and Proto-Tocharians, and that later advanced eastward and found its way to Xinjiang.

The differences in anthropological type between the Afanasievo Culture people and the ancient population of Siberia, and the complete resemblance of the Afanasievo Culture to the originators of the Pit-Grave Culture, encouraged G. F. Debets as early as 1948 to advance a hypothesis of the migration of the Afanasievo Culture population from the West. This viewpoint was supported by S. V. Kiselev and others, since the Afanasievo Culture displays no roots in the Neolithic of Siberia, whereas the anthropological type and many features of the burial practices and inventory, and, particularly, of the ceramics are comparable to those of the Pit-Grave Culture (Debets 1948; Kiselev 1960; Alekseev 1961, 380; Gryaznov, Vadetskaya 1968, 165; Tsyb 1980; 1984; Posrednikov 1992; Savinov 1994, 134; Gryaznov 1999, 54). The Pit-Grave Culture originated locally in the Southern Russian Steppe in the third millennium B.C. and occupied the territory from the Danube to the Urals (Merpert 1968; 1974).

The sites of the Afanasievo Culture are located in the Altai, on the Yenisei, and also in Tuva and Western Mongolia (Zimina 1966; Mamonova 1979, 60–74; Novgorodova 1989, 81–86; Kyzlasov 1979). They date from the latter half of the third to the early second millennium B.C. (The radiocarbon dates vary greatly; the calibrated dates place the age of the culture earlier, to the first half of the third millennium B.C.)

Some burial grounds are situated in the interior of the Steppe and in the high mountains, which testifies to the introduction of mobile forms of pastoralism. In recent years Eneolithic complexes, comparable with the Pit-Grave ones, were also discovered on the intermediate territory of the Asian Steppe to the east of the Urals (Potemkina 1985, 276; Evdokimov, Loman 1989, 34–46), which indicate the probability of migration.

Scholars studying the issue of the origin of the Indo-Europeans, even though they locate their original homeland differently, consider the territory of the Eurasian Steppe to be an important center of Indo-European ethnogeny (Schrader 1907; 1935; Georgiev 1958; Dyakonov 1982; Gamkrelidze, Ivanov 1984; Renfrew 1987; 1998; Mallory 1989; 1998; Mallory, Mair 2000; Mair 2005; 2006). The movement of a group of the Pit-Grave tribes eastward in the third millennium B.C. can be linked to the spread of the Indo-Europeans and allows us to put forth the hypothesis that the migrants were the Proto-Tocharians, who separated from the main group at an early period.

It is essential to point out that, along with the predominant Pit-Grave

component, in the Afanasievo Culture of the Altai, the influence of the North Caucasian variant of the Catacomb Culture is also established, which is proven by the spread of censers (Tsyb 1980; Kovalev, Rezepkin 1995, 16–20). The Catacomb Culture extended eastward up to the Volga-Ural region (Smirnov, Kuzmina 1977; Malov, Filipchenko 1995).[3]

A combination of the Pit-Grave and Catacomb elements is determined also in the Zaman-Baba Culture in the Bukhara oasis. E. E. Kuzmina (1958) and B. A. Litvinsky (1963, 127, 128) have already advanced a hypothesis for the Indo-European and, possibly, Proto-Tocharian attribution of the Zaman-Babians.[4]

The interaction, in the development of the Afanasievo and Zaman-Baba cultures, of two distinct cultures, Pit-Grave and Catacomb, may account for the contacts with different groups of the Indo-European languages, evident in Proto-Tocharian.

Steppe migrations were brought about apparently by demographic changes—the growth of the population, intensified by the climatic crisis of the increasing aridity of the climate, recorded simultaneously from Central Europe to China (Han Kangxin 1998). Some of the Pit-Grave tribes, after coming into contact with the Catacomb groups, advanced eastward; one tribe separated and headed for the south. As a result of interaction with the indigenous tribes there, the Zaman-Baba Culture was developed, and later came into contact with the farming populations of Bactria and Margiana.

Another group advanced to the Altai and further to Tuva and Western Mongolia. The appearance in Xinjiang of the Caucasoid population in Keremchi and Gumugou is possibly linked with the same wave of migration.[5] If this hypothesis is validated, we could pinpoint the time at which the Tocharians first appeared in Eastern Turkestan at the turn of the third to second millennium B.C. and corroborate the linguists' assertion that the Tocharians arrived in Eastern Turkestan before the Iranians, and that they had cultural relations with the Finno-Ugrics (Burrow 1955; Benveniste 1949; Pulleyblank 1966; 1996; V. V. Ivanov 1985). This hypothesis is corroborated by the stability of anthropological type and dress in Xinjiang before the time of the historical Tocharians.

Contacts of the Xinjiang People with the West in the Bronze Age

The next stage in the development of the pastoral cultures in the Steppe was the Andronovo period (Maps 11, 15). As already mentioned, the culture took shape in the eighteenth-sixteenth centuries B.C. (in the twentieth to eighteenth centuries B.C. according to the calibrated radiocarbon dates), in the forest-steppe between the Volga and the Urals. The Andronovo tribes made four pivotal inventions:

1. They learned to smelt ore, to make an alloy of copper and tin—bronze, a metal stronger than copper—and to cast in bronze socketed implements and weapons, using bivalve molds. The rich deposits of the Urals served as the ore base.

2. For the first time in the Steppe, to protect the mines in the Southern Urals, fortified settlements were built—prototowns, which were centers of metallurgy (Batanina 1995; Arkaim 1995).

3. The Andronovo people invented the light war chariot drawn by a pair of horses. Burials of warrior-charioteers that are the oldest in the Old World were discovered in the Urals. The dead are buried together with a set of weapons, a chariot, and horses (Smirnov, Kuzmina 1977; G. B. Zdanovich 1988; Gening 1977; V. F. Gening, G. B. Zdanovich, V. V. Gening 1992; Kuzmina 1994a; Vasil'ev, Kuznetsov, Semenova 1994; Vasil'ev 1995; Tkachev 1998; D. Zdanovich 2002; Epimakhov 2003; N. Vinogradov 2003). To draw the chariots, fast, light, elite breeds of horses were developed for the first time in the world. The modern Akhal Teké, Arab, and English breeds can all be traced back to these horses (Tsalkin 1972a; Kovalevskaya 1976; Kuzmina 1977a).[6]

These innovations rendered the Andronovo tribes invincible and allowed them to spread east into Kazakhstan, Kirghizstan, and Southern Siberia, and south down to the Amu Darya. The wealth of the ore deposits of the Urals, Kazakhstan, Central Asia, and the Altai made the Andronovo tribes the most productive metallurgists in Eurasia. Their products spread westward up to the Dnieper and south to Southern Turkmenistan.

The earliest evidence of the penetration of the early Andronovo metallurgists and charioteers into Central Asia is the casters' settlement of Tugai, where ceramics from the neighboring farming settlement of Sarazm were found alongside the early Andronovo ceramics of the Petrovo type (Avanesova 1996), and the burial ground of Zardcha-Khalifa, where early Andronovo bone cheek-pieces and a bronze bit are present in the Bactria-Margiana complex (Bostongukhar 1998, 56–63).

Relations were established with Xinjiang, as documented by finds of analogous metal articles. The oldest of these, perhaps, is the pin with a bispiral head from chance finds in Loulan (Bergman 1935, pl. XVI, 3). The center of origin of these adornments was the region of the Caspian Sea Southeast Littoral, where they appeared in the culture of Anau-Namazga IV in the mid-third millennium B.C. and persisted throughout the course of the second millennium B.C. (Kuzmina 1966, 78–80, pl. XVII 7, 27–29). In terms of location, the nearest finds similar to Xinjiang materials come from the Khak hoard in Ferghana dating

from the turn of the third-second millennium B.C. Another variant of the bispiral pin comes from the Tulkhar burial ground in Tajikistan (Mandelshtam 1968). Occasionally, this pin type is found at the sites of the Andronovo (Borovoe) and Tazabagyab cultures in Khorezm (Kokcha 15). Due to the wide chronological and geographical range of distribution of this type of ornament, the time and place of origin of the specimen from Xinjiang cannot be determined without spectrographic analysis.

The influence of the Andronovo metallurgical center on Xinjiang in the period from the fifteenth to the ninth century B.C. is unquestionable. At that time the Xinjiang population was Caucasoid, but it belonged to different anthropological types. The archaeological sites are represented by *tepes*,[7] settlements of farmers and sites of pastoralists; the burial practices and ceramic assemblages are very diverse. This points to the complex character of ethnogenesis in Eastern Turkestan, where, among different groups of the Caucasoid population, one group succeeded another, and some groups coexisted.

Metal was found at many sites (Figs. 48, 49, 55). The Xintala settlement is the earliest. According to ^{14}C analysis the calibrated dates are 1700 B.C. and 1300 B.C. This is a *tepe* with two archaeological levels: the lower one has painted ceramics along with vessels with comb-shaped geometrical decorations (Debaine-Francfort 1988, 16). As I could not familiarize myself with these ceramics *de visu*, I cannot judge as to the culture they belong to. In the lower level were found a copper single-edged knife, an awl, and a stone mold for casting the awl (Mei, Shell 1998, 584, fig. 1.1). A celt with an oval socket with raised borders, a socketed two-bladed arrow, an awl, and a fragment of a knife were discovered on the surface of the settlement (Mei, Shell 1998, fig. 3.1).

In the Qizilchoqa burial ground of the Wupu group near Hami (dated by ^{14}C to 1350–1000 B.C.), finds included a chisel, a socketed arrow, a mirror with a protruding handle, and beads sewn onto boots (Debaine-Francfort 1988, 18–19, II: 5) (Fig. 57). In the Yanbulaq burial ground of the same Hami group (dated by ^{14}C to 1110–525 B.C.), seventy-six graves were excavated, with ninety-four bronze artifacts. Some of the corpses belong to the anthropological type of Gumugou. Articles found included single-edged knives, socketed arrows, awls, round horse plates with a punched ornament (flat and with a small loop), a temporal ring (a ring affixed not to the ear but to the temple), beads, and mirrors with a small loop-handle (Mei, Shell 1998, 586, fig. 1: 2–5: 3: 6; 4: 1, 2; 5: 14; 6: 1–3: 12, 13). At the settlement of Lanzhouwanzi of the Nanwan group (dated by ^{14}C to 1335 ± 75 B.C.) were found a celt, but with a ring-shaped top, and a big cast cauldron.[8] In the Nanwan burial

ground (dated by ^{14}C to 1050 B.C.) were found a celt, knives, an arrow, an awl, a mirror with a central flange, beads, and earrings. At the Kharakhojo settlement in Turfan (dated by ^{14}C to 945–100 B.C.) were discovered a sickle, awls, and an arrow with a triangular head. Arrows were found at the settlement of Ka'ersang (Qaraüzhmä). At the settlement of Aqtala, in the western part of Xinjiang, there is a knife with a straight back cast in bronze that contains 1.2% tin. The finding in the Altai Region outside the early complex of the Keremchi burial ground of two stone molds is interesting. One is for casting celt-spades with a round protruding socket that has a raised border and a small loop (Antonova 1988, 149; Kuchera 1984, 42); the other is for making awls, adzes, and daggers (Varenov 1998b, 62–63, fig. 1: 7–10).

There were also chance finds of metal articles in Eastern Turkestan. A celt and an arrow or javelin were discovered in Loulan by Sven Hedin (Bergman 1935, pl. XVI 1, 7), an asymmetrical celt at an unspecified location in Xinjiang, and a celt-spade in Ürümchi (Debaine-Francfort 1988, figs. 9, 3, 5) (Figs. 49, 52–56).

The hoard of Agharsin (in Gongliu [Toquztara] county) is the find of greatest interest. It was discovered in 1975 in the district of Toquztara at a depth of 1 m (Debaine-Francfort 1989, 200, fig. 20, pls. II, 5, 6; Ke 1998, figs. 1–6). It includes three lop-headed axes, three sickles, five chisels, and one celt-hammer as well as three adzes with a flange (An 1998, photo 2–5, fig. 2: 10). Originally the hoard was assigned to the time of the Warring States, to the advanced Iron Age. Wang Binghua assigned it to the early Bronze Age and synchronized it with the Gumugou burial ground. C. Debaine-Francfort pointed out the possibility of synchronizing it with the Andronovo Culture, but assigned it to the Saka period. Ke Peng (1998, 580) dated it to 1500–1000 B.C. Comparison of the bronzes from Xinjiang with the Andronovo items allows a refinement of their chronology and origin.

Socketed two-bladed javelins and arrows with a hidden or protruding socket appeared in the Andronovo Culture in the seventeenth century B.C. and were developed until the late Bronze Age.[9] The arrows of the Saka epoch were formed on their basis. Socketed arrows were not typical of the farmers of China, Bactria, Margiana, and Chust in Ferghana. The closest analogies of the specimens from Xintala (Yengidala) and Kersan are to the late Andronovo sites in Kazakhstan and Ferghana (Kuzmina 1966, 33–37, pl. VI, II; 1994c, fig. 42, 7), dating back to the turn of the second-first millennium B.C.

Celts appeared in the complex of Turbino-Seima (seventeenth-fifteenth centuries B.C.) and developed till the Saka epoch. The specimens with an oval socket and a cast raised border from Loulan, Aghar-

sin, and Xintala can be dated to the late Bronze Age (twelfth-ninth centuries B.C.), by analogy with the celts from the Sadovoye hoard in Kirghizstan (Kuzmina 1966, 22, pl. IV, 13; 1994c, fig. 31).

The four-faceted asymmetrical celt from Xinjiang is similar to the weapon from Regar in Tajikistan, dating from the late Bronze Age (Kuzmina 1966, 23, pl. IV, 7) (Figs. 50, 51, 54, 55). The celt-spades from Ürümchi and Nanwan belong to the weapons whose production center was located in Ferghana and in Kirghizstan; they date back to the late Bronze Age (Kuzmina 1966, 24–25, pl. V; Zadneprovsky 1996, 17, fig.1b). The celt-spade cast from a mold, from Keremchi, is an improvement on this initial type and is fundamentally different from the Chinese celt-spades with their characteristically square socket. The miniature celt-hammer from the Agharsin hoard finds analogies in Kirghizstan in the hoards of Sadovoe and Shamshi (Kuzmina 1966, pl. IV, 8; 1994c, fig. 43a, 18).

Chisels were found at many sites in Xinjiang (Fig. 53). The socketed chisel with a cast raised border on the socket from Agharsin belongs to the type characteristic of the later Andronovo complexes, represented in Semirechye in the hoards of Alekseevskoe, Sadovoe, Sukuluk, and Shamshi (Kuzmina 1966, 26, pls. III 3-b; 1994c, figs. 43a, c).

The adzes with a flange from Agharsin are analogous with the specimens from the hoards of Sukuluk, Sadovoe, Alekseevskoe, and Shamshi (Kuzmina 1966, 18–20, pl. III, 9, 10, 14–17; Kuzmina 1994c, figs. 43a, b) and belong to the East Kazakhstan forms, while I included them in the Semirechye center of metalworking.

The three lop-headed axes from Agharsin belong to the specifically Andronovo type known all over the range of that culture (Fig. 52). The major findings are concentrated in Eastern Kazakhstan, Ferghana, and Semirechye, including the hoards of Shamshi, Sukuluk, Issyk Kul, Alekseevskoe, and Turksib (Kuzmina 1966, 11–14, pl. II; 1994c, fig. 43a; Avanesova 1978; 1991). The axes from Agharsin, Alekseevskoe, and Sukuluk are decorated with a similar type of cast ornament.

The three massive sickles from Agharsin belong to the type of sickle-choppers that were in use from the Volga all the way to Western Siberia (Fig. 54). The bulk of the findings come from Eastern Kazakhstan, Kirghizstan, and Semirechye, where hoards were found with correlative types of objects, which enables their synchronization. The Agharsin hoard is perfectly analogous with the complex of the Shamshi hoard.

The chronology of hoards is determined on the basis of: (1) articles having a short range of existence (for example, the razors from Shamshi), analogous with the European types; and (2) articles and the molds for their manufacture found in the hoards at the settlements with ceramics that have an applied roller (for example, the mold of the axe in Kairakkum). This enables the hoards to be dated to the thirteenth-ninth centuries B.C., which is validated by the dates of the Xinjiang sites according to ^{14}C.

TABLE 1: CORRELATION OF THE TYPES OF METAL ARTICLES IN THE HOARDS OF XINJIANG AND SEMIRECHYE

Hoard	*Axe*	*Adz*	*Chisel*	*Sickle*	*Hammer*
Agharsin	+	+	+	+	+
Shamshi	+	+	+	+	+
Turksib	+		+	+	
Alekseevskoe	+	+	+	+	
Sukuluk	+	+	+		
Sadovoe		+	+		+

The ornaments found in Eastern Turkestan do not conflict with these conclusions (Fig. 57). In the burial ground of Qizilchoqa (dated by ^{14}C to 1350–1000 B.C.), boots were found that were decorated with bronze beads. This custom was very widespread in the Andronovo culture. A mirror with a protruding handle was found at the same site. This type is familiar in Kirghizstan in the hoards of Sukuluk, Sadovoe, and Shamshi, and in Ferghana at the settlements of the Chust culture, where molds for their casting are present (Zadneprovsky 1962, 68, pl. XX 4, 5; Kuzmina 1966, 63, pl. XIII 1, 4, 6, 8, 9; 1994c, fig. 43a). The mirror with a small loop-handle comes from the settlement of Yanbulaq (dated by ^{14}C to 1110–525 B.C.). Its analogies are familiar at the late Andronovo sites throughout their geographical range, including Siberia.

Mirrors, disk-shaped and round with a protruding handle, appeared in Southern Turkmenistan in the Namazga Culture and in the Bactria-Margiana complexes that were part of the range of the farming cultures of the Ancient East, where this type, familiar in Susa IA, in the royal tombs of Mari, in Hissar II B, Sialk, Mundigak, etc., originated (Map 14).

As a result of the contacts of the Steppe population with agriculturalists, the round mirror type appeared in the Zaman-Baba Culture and remained in Transoxiana in the developed Bronze Age (the Gurdush burial ground), while the mirror type with a protruding handle was borrowed from the south into the Urals by the Petrovo tribes. In the developed Andronovo epoch, mirrors were unknown either in the Alakul or Fedorovo complexes, but they remained with the Steppe population of Central Asia where the type of a round mirror with a small loop

developed, as found in the burial ground of Muminabad (Kuzmina 1966, pl. XIII, 7). It is familiar in the late Fedorovo burial grounds of Smolino in the Urals and Kara Kuduk in Kazakhstan.

In the late Bronze Age, different types of mirrors became widespread: round with a small loop, round with a protruding handle, and square with a small loop and rounded corners. They are present in the Alekseevskoe and Dandybaevsky complexes of Kazakhstan, in the late-Bronze complexes in Siberia (the Elovka burial ground), at the Semirechye-type sites in Kirghizstan, and in the Chust Culture of Ferghana, where there are also molds of these articles (Kuzmina 1966, 66–69, pl. XIII).

The data given in this excursus must be considered when addressing the disputed issue of the origin of mirrors in China, and they seem to point to the western origin of these adornments. In China a small number of mirrors appeared in the Central Plain in the late Shang period (this type is represented in the tomb of Fu Hao [thirteenth century B.C.], King Wuding's wife, around 1300 B.C., and elsewhere in Xiaotun at the emperor's cemetery in Anyang [Linduff 1996b]). In the Western Zhou epoch (1100–700 B.C.) they became extremely rare but revived after 700 B.C. (Juliano 1985; Mei, Shell 1998, 53). At the same time, in the culture of the pastoralists of Central Asia, mirrors remained in use beginning from the late third millennium B.C. (Zaman-Baba) and up to the Scythian epoch, where, based on the round mirror with a small loop, the Scythian type of mirror took shape with a small loop and a flange.

Since mirrors are widely represented in the final Bronze complexes in Eastern Turkmenistan, one may assume that it was through Xinjiang that mirrors reached China in the late Shang epoch. It should be noted that the Scythian type of mirror with a flange was also familiar in Xinjiang in the complexes of the Saka period (Mei, Shell 1998, fig. 4:3).

The round earring with a spirally twisted pendant cone, from the Yanbulaq burial ground of the late twelfth to sixth centuries B.C. (Mei, Shell 1998, fig. 2), is analogous with the earrings found in the burial ground of Ketmen-tyube in Kirghizstan and in three burial grounds in Ferghana: Arsif, Yapagi, and Kashkarchi, that from the latter being made of gold and silver. Relying on the classification of Andronovo earrings worked out by N. A. Avanesova (1972), N. G. Gorbunova dated the complexes to the thirteenth-eleventh centuries B.C. I believe, on the basis of the similarity of the vessel from Yapagi with the ceramics of the burial ground of Vuadil, dated by the bronze arrowhead with a hidden socket approximately to the turn of the first millennium B.C., that they may go back to the last quarter of the second millennium B.C.

It is important that a bronze mirror with a small loop was found in

the burial ground of Yapagi that is analogous with the ones from Xinjiang and China, and in Vuadil, a trumpet-shaped earring: analogous earrings of the characteristically Andronovo type, often gold or gilt, are widely represented in the Andronovo range, in the burial ground of the Fedorovo and Alekseevskoe types in Northern, Central, and Eastern Kazakhstan, and of the Ob' variant in Siberia (for instance, Borovoe, Sanguyr II, Tau Tary, Kanai, Maly Koitas, etc.) (Avanesova 1972). They are also familiar at the sites of Central Asia in the burial grounds of Tash Tyube II and Tegirmen Sai in Kirghizstan, Vuadil, and Dakhana in Ferghana, Muminabad in Uzbekistan, Dashti Kozi, and in the Tandyr Yul burial in Tajikistan (Kuzmina 1966, 75, pl. XIV: 1, 3, 4, 70; Kuzmina 1998a, fig. 5; Kuzmina, Vinogradova 1996, fig. 6: 1). (The date of fourteenth-eighteenth centuries B.C. suggested by Avanesova for this type is clearly underestimated, because some complexes with earrings contain articles of the final Bronze Age, for example, bracelets with small horns.)

These adornments enable us again to bring up the issue of relations with China (Lin Yun 1986, 248, fig. 50: 8; Kuzmina 1994c, 242, fig. 54: 2, 3, 11; Bunker 1993, 37, fig. 4; 1998, 611, figs. 3, 4, 11). Odd findings of analogous earrings were made in China in its northeastern provinces: in Liujiahe, Pingdingshan, and Liaoning. It is essential to note that some of the ornaments in the northern provinces are made of gold, which, as was shown by E. C. Bunker (1993; 1998), was not used by the nobility in the Shang epoch in Anyang, where the prestigious material was jade.

All this attests to the western origin in China of the gold trumpet-shaped temporal rings, which may have found their way to the nobility of the northern tribes either from Siberia or, more likely, from Semirechye and Ferghana.

In sum, in the thirteenth-ninth centuries B.C., Xinjiang saw the spread of metal articles, their production center being located in Semirechye, where an independent metallurgical seat took shape in the Bronze Age (Kuzmina 1966, 96–98; Degtyareva 1985, 90–96). It was part of the metallurgical province that comprised all the Eurasian Steppe from the Danube to the Altai, but its production was distinguished by the presence of specific types of articles and a peculiar composition of alloys, indicative of the use of the local ore base.

Progress in metallurgy at the end of the second millennium B.C. led to the emergence of groups of specialist craftsmen-metallurgists working for hire. This allows no doubt that in Eastern Turkestan there existed independent metallurgical production, a conclusion borne out by the finding of molds in Yengidala and Keremchi and by the presence of ancient copper workings, dating, however, from the early Iron Age

(Mei, Shell 1998, 594). Influence from west of the Semirechye metallurgical center, however, was a determinant in the formation of metallurgy in Xinjiang, a conclusion substantiated by the typological and technological similarity of the production. The spread in Xinjiang of the western types of metal products may have been a result of, first, an exchange conducted in stages; second, the advent of individual clans of casters from Semirechye; and, finally, the migration to the east of groups of the late Andronovo population.

It is likely that the intensification of contacts was triggered by important ecological and historical changes in Asia in the late Bronze Age. The abrupt cooling and humidification of the climate forced part of the Andronovo population to abandon the complex farming and livestock herding economy and change over to a more mobile nomadic lifestyle with a seasonal change of pastures. This enabled the development of new ecological niches: the highlands of Tian Shan and the Pamirs and the deserts of Central Asia.

The condition for a change-over to nomadism was the emergence of riding and an increase in the importance of the horse. Horsemen with arrows and spears protected their herds. Social differentiation began as rich families that owned cattle and metal appeared. In the event of a military threat, valuable metal articles would be dug into the earth. These are the hoards found in Semirechye and the Agharsin complex in Xinjiang.

Important innovations in the culture, an ecological crisis, and a search for new land led to ethnic migrations in the Steppe (Map 12). It is conceivable that at that time groups of pastoralists from Kirghizstan and Ferghana advanced to Xinjiang where, on the borders with the oases, there were lands suitable for livestock herding (M. P. Petrov 1966; 1967).

This wave is likely to have had a bearing on the increase in the importance of the horse in the cultures of Xinjiang. Horse bones were found at many sites (Shirenzi [Sintash], Karakhoja, Wupu [Qizilchoqa], Lanzhouwanzi [Kök-turaq]). There are also findings of wooden cheek-pieces with orifices and other parts of horse harnesses, analogous with the Andronovo examples (Jettmar 1992, 142, 143; cf. Kuzmina 1994c, 186–88, figs. 39, 42).

Since most researchers believe the originators of the Andronovo Culture to be Indo-Iranians, there is reason to associate the ethnic wave from Kirghizstan into Xinjiang in the thirteenth-ninth centuries B.C. with the first advance of Iranian-speaking peoples, which is validated by the linguistic data on the distribution of Iranian speech in Eastern Turkestan, although linguists refer this process to a much later date.

The relations of Xinjiang and Central Asia were beyond doubt of a

mutual kind, as proved by the findings of jade in Chust. Cultures of Chust in Ferghana, of Yaz 1, Kuchuk, and Tillya in Margiana and Bactria—all these cultures are characterized by the same types of querns, stone sickles, and knives, and by ceramics with geometrical ornament. However, the character of cultural interactions and the direction of cultural impulses remain debatable and require thorough study (Masson 1959, 106, 107; Zadneprovsky 1962; 1994; 1995; Kuzmina 1976, 135–38; Antonova 1988, 152–55).[10]

Thus, analysis of the archaeological material makes it possible to refer the starting-point of the contacts—probably migrations—of the shepherds with Western China to the third millennium B.C. and to pose the question of the spread in China, under their influence, of metallurgy and wheeled transport. The next stage goes back to the Andronovo epoch and is related to the development by the Andronovo peoples of all the ecological niches suitable for livestock herding. Ecologically, Xinjiang presents a very mixed picture: barely passable deserts neighbor on lush oases, where farming developed, and the Steppe, suitable for pasturing herds. It was this ecological niche that was developed by shepherds, particularly in the west of Xinjiang. The neighboring Andronovo peoples became the suppliers to the east of metalworking skills and finished metal products; and under their influence there appeared in China some types of weapons (socketed spears and arrows) and ornaments: mirrors, temporal rings and earrings made of gold, all alien to the Chinese tradition. The similarity in construction of the Chinese chariots with those of Andronovo and the emergence in Anyang of the ritual of burying horses and chariots are likely to attest to the borrowing from the west, from Andronovo Culture representatives, of the chariot fighting method.

Consequently, it may be said with confidence that the shepherds of the Steppe played an important role in the development of the culture of the Old World in East Asia.

The starting-point of the contacts of the Steppe tribes with the east along the route of the future Silk Road was established around the turn of the third-second millennia B.C., and this enables one to push back the time of the formation of the eastern route to extreme antiquity.

Chapter 6

Conclusion

As a result of the analysis performed here, several matters have been established.

1. The functioning of certain sections of the future Silk Road, along which spread *people*, *objects*, and *ideas*, commenced at least as long ago as the latter half of the third millennium B.C. and considerably intensified in the second millennium B.C.

2. We have identified the prevailing orientations of the cultural relations in different regions at different historical stages and the times at which the functioning of certain sections of the future Silk Road routes started and was most intense.

3. We have determined the pivotal role of the Eurasian Steppe populations in establishing pan-Eurasian ethnic and cultural relations in the course of the Copper and Bronze Ages.

4. We have also shown the role of the Steppe in the development of transport, which intensified the potential for ethnic migrations and exchange along the Silk Road routes.

5. Allowing for the decisive role of the interaction of man and nature in the cultural evolution and the fact of arrhythmia, intrinsic to the Steppe ecology, we have made an attempt to correlate the dynamics of the change of the natural and climatic conditions of the Steppe with the stages of cultural evolution and the regional characteristics of this process.

During the late Neolithic and the early Copper Age, the Eurasian Steppe was divided into two large regions: the European one to the west of the Urals and the Asian one to the east of the Urals.

The peoples of the Southern Russian Steppe were closely interlinked, belonging to the successively changing and, probably, related communities: Mariupol, Sredny Stog, and Pit-Grave. They were part of the circle of European cultures, maintaining particularly intensive relations with the farmers of the Balkans and the Danube Region, whence the food-producing economy (farming, cattle, and sheep or goat) was brought to the Steppe and metal was introduced.

The domestication of the horse was a tremendous contribution of

the Southern Russian Steppe population to the history of civilization in the Eneolithic period. At the primary stage of domestication, according to S. Bökönyi, the horse was used as a meat animal and not as the mount of rider-warriors, contrary to V. N. Danilenko, N. N. Shmaglii, D. Ya. Telegin, M. Gimbutas, D. Anthony, and J. Lichardus, who asserted massive invasions of wild riders from the Steppe that destroyed the culture of the European farmers.

The true turning point in the cultural history of the Eurasian Steppe population was the spread of wheeled transport in the Novotitorovka and Pit-Grave cultures, represented by four-wheeled and two-wheeled, mainly closed, wagons. It was the use of wheeled transport that made it possible for some of the Steppe population to change to a mobile lifestyle, for migrations to occur, and, ultimately, for the establishment of the Great Silk Road routes.

It may be assumed that the migrations of the Pit-Grave Culture people were caused by unfavorable natural conditions that formed in the Steppe. The establishment of the Silk Road's Southern Route—to Central Asia—is demonstrated by the Zaman-Baba Culture near Bukhara.

In contrast to the Southern Russian Steppe, in the Asian Steppe the formation of the food-producing economy occurred much later, which was due to its ecological peculiarities—the abundance of fish in Khorezm and of ungulates in Kazakhstan, which secured a stable food supply and did not stimulate the population to change over to a food-producing economy (A. V. Vinogradov, G. F. Korobkova). That is why the population of Southern Central Asia did not play the decisive role in the fortunes of the Central Asian Steppe and the Kazakhstan Steppe, in contrast to the role that European farmers played in the development of the Southern Russian Steppe.

In Central Asia contacts with agriculturalists are recorded later: these are the recovery of hand-shaped sharp-bottomed pottery with stamped ornament at the settlements of Sarazm near Samarkand and Taip in the Murghab oasis, and the discovery in Khorezm of vessels imitating Anau vessels and in Lyavlyakan of molds for axes of the Irano-Central Asian types.

The first culture to show that the pastoral groups were advancing south is the Zaman-Baba, which is believed to have originated with the participation of the Pit-Grave and, partly, Catacomb populations, and through the establishment of active contacts with the farmers of the Namazga V period. It is from the late Pit-Grave period that one can speak of the beginning of the Silk Road's Southern Route, along which movement was carried out from west to east and further southward into Central Asia.

The first contacts along the Silk Road's Eastern Route date back to

the same time, which is proved by the appearance in Southern Siberia of Afanasievo Culture sites. According to the opinion of most researchers, this culture came from the west, was related to the Pit-Grave Culture, and was influenced by the Catacomb Culture. Afanasievo Culture sites were also found in Xinjiang, at the early complex of the Keremchi burial ground and, possibly, Gumugou, which points to the formation of the northern section of the Eastern Route of the Silk Road, in Xinjiang.

One hypothesis has it that the Afanasievo Culture people were Proto-Tocharians by language, and that their migration to Siberia and Xinjiang reflects the first wave of the movement eastward of the Indo-European speakers. The finding of the bispiral pin in Loulan allows one to assume also the establishment of Xinjiang's southern relations either immediately with Bactria or, which is more likely, with Ferghana, and the inception of the Eastern Route's southern section.

The next important stage of the Steppe's cultural evolution was the formation in the Urals and Western Kazakhstan of the sites of the Sintashta and, related to them, Petrovka types, all united in the Novy Kumak chronological horizon; and the establishment in the Middle Volga of the cognate Potapovo-type sites, which came as a result of the consolidation of the late Pit-Grave-Poltavka, Catacomb-MVK, and Abashevo culture populations, the latter claiming the decisive role in this bloc of cultures. The Don Abashevo Culture was also similar to this group.

The efflorescence of the culture of the Sintashtian peoples is marked by a series of momentous interrelated innovations:

1. progress in metallurgy and metalworking;
2. the appearance of fortification and the emergence of fortified settlements—prototowns;
3. the development of horse breeding and of the horse cult;
4. the spread of horse-drawn chariots; and
5. the emergence of warrior-charioteers along with the assortment of weapons and tools typical of them (bow, arrows, spear, axe, knife-dagger, mace, lash, adze, abrasives, and warders [scepters]).

According to some researchers, this efflorescence was connected with the development of the Southern Uralian copper deposits, which contributed to the progress of metalworking (the improvement of furnace construction and the alloying of copper with arsenic). This enabled the organization of large-scale metallurgical production and working for export, and it created the prerequisites for the formation of prototowns. The need to protect the mines, the metallurgist settlements, and their output stimulated the emergence of fortification and the spread of chariots and the weapons of the charioteer.

The Sintashta and the related Petrovka and Potapovka populations established wide and manifold relations in Eurasia. There are traces of distant western contacts with the tribes of the late MVK Culture and further—right up to Mycenaean Greece either immediately or, more likely, via Southeastern European groups (e.g., the Monteoru Culture). This is documented by the spread of similar types of cheek-pieces and Mycenaean ornament, particularly to the west of the Urals where, in addition to these, bone buckles typical of the MVK Culture are also represented.

Along the Silk Road's Southern Route the Petrovka population spread to Central Asia, bringing with them metallurgical technology and horse chariots, and coming into contact with the southern farmers. Evidence for this is the discovery near Samarkand of the Tugai settlement, the Petrovka metallurgical center where, in a complex with Petrovka ceramics, vessels of the neighboring farming settlement of Sarazm were found, and also of the Zardcha-Khalifa burial in which, side-by-side with Sintashtian cheek-pieces, a pin with a horse figure and metalware of the Bactria-Margiana type were discovered.

A hypothesis has been put forward that the Sintashta-Petrovka population referred indeed to the Indo-Iranian group of the Indo-European peoples (K. F. Smirnov, E. E. Kuzmina, V. F. Gening, et al.). If that is true, the appearance of the Sintashta and Petrovka sites in Central Asia can be accounted for by the first wave of the advancement of the Indo-Iranians from their original homeland southward along the Silk Road's Southern Route.

The Steppe evolution toward the formation of an urban civilization, which began to take shape at the Sintashtian stage, was interrupted because of the specifics of the Steppe ecological system. In the mid-second millennium B.C., the political situation in the Steppe stabilized, the need for fortified settlements and military elite disappeared, and optimal natural and climatic conditions, favorable for the development of a complex farming-livestock herding economy, prevailed in the Steppe. This led to the formation, on the basis of the related preceding types and cultures, of two large communities—the Timber-Grave in the west and the Andronovo in the east. Instead of engaging in intensive evolution, craft specialization, and the initiation of an urban system, these took the path of extensive evolution by means of territorial expansion, preserving the traditional settled agropastoral economy with the dominance of livestock herding, and gradually, stage by stage, development of new territories.

The Andronovo tribes settled all over Kazakhstan and advanced

across Siberia right up to the Yenisei and also southward to Central Asia. The Timber-Grave tribes advanced into Transcaspia. In the process of assimilation with the indigenous population of Central Asia, syncretic cultures and different types of the Andronovo Culture were formed. The Andronovo peoples of the Fedorovo type crossed the Amu Darya, entering Afghanistan and coming into contact with the farming population of Southern Central Asia and Tajikistan's Vakhsh (Bishkent) Culture, as documented by the mixed burial grounds and the numerous discoveries of Steppe pottery and Andronovo metalware in the relevant archaeological levels of the ancient farming settlements.

Since most researchers accept the hypothesis that the Steppe groups belonged to the Indo-Iranians, their gradual infiltration in separate waves into Central Asia can be recognized as the second wave of the Indo-Iranian advancement southward along the Southern Route of the future Silk Road.

Contacts along the Silk Road's Eastern Route also developed in the Andronovo epoch. This is proved by discoveries in Xinjiang of metalware and, possibly, pottery with a stamped geometrical ornament. Relations with China (through Xinjiang and other northwestern territories) were established at this time, demonstrated by findings in China of Andronovo-type bronze socketed arrowheads, mirrors, and gold trumpet-shaped temple-rings. The Andronovo influence is likely to have accounted for the appearance in China of such important military innovations as the use of horse chariots and horses themselves. Their western, Indo-European origin is borne out by written sources, linguistic data, mythology, and finally, archaeological materials. M. Loehr, S. V. Kiselev, and others also raised the question as to the possible influence of the Andronovo tribes on the development of Chinese metallurgy, but the precise nature of the relationship between the two traditions is still being debated.

Important innovations in the culture of the Steppe population and a change of the situation on the Silk Road routes took place in the last quarter of the second millennium B.C. According to paleogeographical data, this epoch was characterized by a crisis of the Steppe ecosystem, an abrupt cooling. The ecological crisis was aggravated by a social and economic crisis, brought about by the fact that, by the twelfth century B.C., all the Steppe had already been developed by pastoral peoples, and no further extensive expansion of the territory was possible. The way out of this crisis lay in a changeover to a more progressive form of pastoralism, namely, the driving-to-pastures or *jailau* method. The prerequisites for this method were the selection of a herd fit for migrations, with the dominance of horses and sheep, which were capable of getting fodder from under the snow; the emergence of a light dwelling

(the protoyurt); and the spread of horseback riding, attested by the appearance of the new types of cheek-pieces (the prototypes of the Scythian ones) and the requisite assortment of weapons.

An important factor in changing over to the driving-to-pastures style of livestock herding was the wider use of the already-known Bactrian camel, which is documented by the increase in the amount of its bones in the osteological materials of the settlements.

The change-over to semi-nomadic pastoralism allowed new ecological niches to be developed—deserts and highlands where burials and temporary sites are recorded—and led to the intensification of the Steppe peoples' contacts in both the latitudinal and meridional directions. In the Steppe, open to wide movement, applied-roller pottery and similar types of metalware were distributed all the way from the Danube to the Altai. Metalworking became a specialized craft branch, a conclusion validated by the spread of founders' hoards.

Some researchers assert that, under crisis conditions, part of the population, both Timber-Grave and Andronovo, migrated southward to Central Asia. This is validated by the multiplicity of applied-roller pottery at the sites on the fringes of the farming oases and in the archaeological levels of the settlements. The wave of movement along the Silk Road's Southern Route may have been connected with the settling of Iranian-speaking peoples of the Indo-Iranian branch that had earlier dispersed in their original homeland.

In the twelfth-eighth centuries B.C., contacts intensified along the Silk Road's Eastern Route. Chinese physical anthropologist Han Kangxin notes in western Xinjiang burial grounds the skulls of the Pamiro-Ferghanian (Andronovo) type and the Mediterranean type of the Pamir Saka.

At Xinjiang's settlements and in its burial grounds, which are concentrated along both the northern and southern sections of the Eastern Route, bronze articles of the late Andronovo types were found in great numbers. The complex of the Agharsin hoard is particularly interesting, because it is completely analogous with the hoards of Semirechye, which gives grounds to speak of the decisive role of the Semirechye metallurgists in the spread of metal in Xinjiang.

Thus, if in the Copper Age the contacts of the Southern Russian population were oriented chiefly westward, in late Pit-Grave times the future Silk Road's southern and eastern routes took shape. In the Bronze Age, the main relations are traced in the direction of Central Asia along the Southern Route, while in the late Bronze Age intensive interactions are recorded along both the southern and eastern routes.

Along the future Silk Road tracks spread *people*, *objects*, and *ideas*. The processes of human migrations resulted in the appearance in Sibe-

ria and Xinjiang of the Afanasievo Culture people, presumably identified with the Tocharians, and in the numerous waves of penetration from the Northwest to Central Asia, first, of the Zaman-Baba, then Sintashta and Andronovo Culture peoples, generally considered to be the still undivided Indo-Iranians or Indo-Aryans and, lastly, the late Andronovo and Timber-Grave tribes—probably Iranian speakers. The movement of people was attended by the appearance of new things, technologies, and ideas. These were all conveyed by means of exchange by stages in all periods, just as they were via the resettlement of metallurgist-founders and the caravan trade, of which one can speak only beginning with the late Bronze Age.

Of special significance to the Bronze Age was the spread of metalware, chariots, horse breeding, and the horse cult, which reflects the Steppe peoples' important contribution to the evolution of Old World civilization, and the role of the future Silk Road routes, which were then in the process of development, in the conveyance of cultural innovations.

The relative chronology of these processes, important to the history of the Old World, is clear and based on the stratigraphy of the sites. As for the absolute chronology, it is the subject of bitter debate. The traditional dates are obtained by the method of analogies along three lines of synchronization, as follows: (1) with Western Europe (especially with Mycenae); (2) with Southern Central Asia; and (3) with China of the Shang-Yin period. These correlate well with each other, yet differ radically from the calibrated radiocarbon dates—the latter are several centuries older. On the other hand, the calibrated dates of the Steppe sites are corroborated by synchronization with the scale of the calibrated dates of the Western Asian and Indian sites. The absence of trustworthy chronology hinders the reliable correlation of archaeological and paleogeographical facts and the reconstruction of the historical processes that took place on the future Silk Road routes. However, given the importance of the Silk Road in the pan-Eurasian spread of cultural innovations, in the Bronze Age it may already justly be called Great.

Appendix

Dating and Comparative Chronologies

There are three principal methods in use for determining the absolute chronology of the Old World's ancient cultures: (1) historical records, based on the manuscripts of the Egyptian and Mesopotamian kings and the Greek Olympiads; (2) dendrochronology; and (3) the radiocarbon dating method. The relative chronology of the Eurasian Steppe is determined using the stratigraphical data of the settlements and the burial grounds.

Determination of the absolute chronology is hindered by the following: (1) the population of the Steppe had neither writing nor its own chronological system; (2) the dendrochronological scale for the Bronze Age sites has not yet been elaborated; and (3) the old radiocarbon dates are scattered within too broad a range and, evidently, their use is methodologically incorrect. For instance, the age of Sintashta burial ground graves of the same type spans the interval between the years 2250–1390 B.C. (without calibration), although, according to A. A. Gavrilov's dendrochronological data, this burial ground functioned for no longer than 130 years. The dispersion of the stratigraphically subsequent sites of the Alakul type is from the twenty-first to the fourteenth centuries B.C., of the still later Amangeldy type, eighteenth-fourteenth centuries B.C., while of the Yenisean Fedorovo sites of the same type it spans from the twenty-seventh to the fifth centuries B.C., which is historically unacceptable (Kuzmina 1994c). That is why a skeptical attitude toward radiocarbon dates, particularly those that were calibrated, prevailed in Russian archaeology until recently, and the principal method of determination of the absolute chronology was that of analogies with the more reliably dated cultures of Western Europe, Southern Asia, and China. In recent years, however, in the laboratories of Europe and the United States, a new series of ^{14}C dates has been obtained, which requires revisiting the issue (Kuzmina 1998b).

The New Radiocarbon Dates of the Steppe Cultures

Testing of wheeled vehicles from Ukrainian Pit-Grave and Catacomb Culture burials, performed in the radiocarbon laboratory at Belfast, has

yielded dates between 2264 ± 25–2083 ± 19 B.C. without calibration (Mallory, Telegin 1994, 30–31). For the burial mounds of the Volga in the laboratories of Arizona and Oxford, the following uncalibrated dates have been obtained: for the Pit-Grave Culture, four dates between 4520 ± 75–4370 ± 75 years ago; for the succeeding Poltavka Culture, 4320 ± 80 and 4070 ± 70 years ago; for the subsequent Timber-Grave Culture, four dates between 3490 ± 70 and 3400 ± 70 years ago. What is fundamentally important is that this newly determined chronology is confirmed by the stratigraphy of the burial mounds (Kuznetsov 1996).

In Oxford, for the Novy Kumak horizon of the Volga Region, five uncalibrated dates of 3710 ± 80 years ago have been obtained, and for the Urals (tested in Arizona), four dates from 3740 ± 50 to 3510 ± 80 years ago (the dispersion of the latter dates is questionable, for they were determined on the basis of skulls of two horses of the same team from the same complex). To determine the sites' true dates, the results were subjected to calibration, which yields the Novy Kumak horizon, according to 1Σ (sigma 1), an age of from the twenty-third to the seventeenth centuries B.C., and according to 2Σ (sigma 2), from the twenty-fourth to the twentieth centuries B.C. (N. B. Vinogradov 1995b; Anthony, Vinogradov 1995; Kuznetsov 1996; Trifonov 1996a, b; Bochkarev 1998), though P. F. Kuznetsov (1996, 58) arbitrarily chose average values, assigning the Potapovo stage to the period from the nineteenth to the seventeenth centuries B.C., which is methodologically doubtful.

This brings up a question as to the correlation between the newly determined dates and the dates obtained with the help of other methods as a result of the synchronization with the sites of neighboring regions, such as Western Europe, Southern Asia, and China, with which the Steppe peoples had contact. Each of these regions has its own independent chronological system, and the Eurasian Steppe provides a unique opportunity for the comparison and reciprocal corroboration of the Old World's three chronological systems.

The European Line of Synchronization

The synchronization of the Novy Kumak horizon sites is established with the Central European cultures of the Bronze A 1, 2 periods according to Reineke, and the Danube Region cultures of the Monteoru I C4–II A stages on the basis of: (1) bone buckles (Litvinenko 1996; Yu. P. Matveev 1996); (2) warty beads (i.e., beads with small projections), dating from the seventeenth–sixteenth centuries B.C. (Bratchenko 1976), found in the burial grounds of Sintashta, Alabuga, Grafskie Razvaliny, and Tanabergen; (3) spiked cheek-pieces that were spread from Kazakhstan to the Danube and the Mycenaean Shaft Graves in Greece (Leskov 1964; Smirnov, Kuzmina 1977; Kuzmina 1980a; 1998b; Goncharova 1996; Bochkarev 1998; Pryakhin, Besedin 1998); and (4) Mycenaean ornaments (Smirnov, Kuzmina 1977; Vasil'ev et al. 1994; Vasil'ev 1995; Obydennov, Korepanov 1997, fig. 59; Penner 1998) and the Post-Mycenaean decoration of the later articles.

The traditional date of the Central European sites of the Bronze A 1, A 2 period is now put back by two centuries, based upon the thoroughly elaborated dendrochronological scale (Bochkarev 1992; R. Krause et al. 1989; Kromer, Becker 1993; Randsborg 1992; Kuniholm 1993). However, the dates obtained by the dendrochronological method disagree with those determined by the radiocarbon method, being some two centuries later than the latter.

The similarity of the cheek-pieces and ornaments with the Mycenaean ones is decisive in determining the age of the Novy Kumak horizon sites. Since the cheek-piece types represented in the Steppe are the most archaic, are quite diverse (which reflects the search for the most effective variants), and can be viewed as a prototype of the Mycenaean types, it was assumed that the traditional date of the Mycenaean Shaft Graves—1570–1550 B.C.—was indeed the *terminus post quem* of the Steppe cheek-pieces and served only as the upper limit of the Novy Kumak horizon (Smirnov, Kuzmina 1977; Kuzmina 1980a; 1994c).

In recent years there has been a tendency to assign the age of the Shaft Graves to an earlier time. The date was shifted back a century by the method of analogies as a result of reinterpreting Mycenae's relations with the sites of Egypt and Western Asia, dated by the historical method (Kemp, Merrilees 1980; Dietz 1991; Coleman, Walz 1997) and also by the radiocarbon method, on the basis of the date of eruption of the Santorini Island volcano (Betancourt 1987; Warren, Hankey 1989; Manning 1995). If the date of seventeenth century B.C. is accepted, this will allow us, accordingly, to lower the age of the Novy Kumak horizon sites as well. However, even in this case, the new calibrated dates of the Steppe complexes will remain older than those obtained by the method of analogies with Mycenae and Germany.

The South Asian Line of Synchronization

The Steppe pastoral peoples in the South bordered the agriculturalists of Central Asia, Afghanistan, and India, whose cultures belonged to the circle of ancient Eastern civilizations (Figs. 22, 23). These groups traditionally had contact. The most ancient evidence of this is the find-

ing of Petrovka-type ceramics at the metallurgists' settlement of Tugai near Samarkand together with the vessels of Sarazm, the neighboring settlement of farmers. B. Lyonnet assigns this complex to the Sarazm III period, N. A. Avanesova, to Sarazm IV (Avanesova 1996).

V. S. Bochkarev (1998) attempts to resolve the situation by assigning to an earlier time the shield cheek-pieces; he suggests this can be done on the basis of a cheek-piece found in the Danube Region, which, according to Zaharia, comes from the early Monteoru complex.

No less important is the Zardcha-Khalifa burial near Samarkand (Bobomulloev 1993; Bostongukhar 1998), where Sintashta-type disc-shaped cheek-pieces and solid bronze bits were found along with articles of the Bactria-Margiana type, metal vessels, a mirror, and a pin with a representation of a horse on its head, whose image, however, is comparable with those from the Steppe (Figs. 16–17).

Relations with the Bactria-Margiana Archaeological Complex (BMAC) are demonstrated by findings of lapis lazuli beads in Sintashta (Kuzmina 1997a), the BMAC-type vessel at the Ustye settlement (N. B. Vinogradov 1995b), and a mirror with a BMAC-type handle at the Krasnoe Znamya burial mound (Sungatov, Safin 1995).

The next stage of relations is represented by findings of imported BMAC pottery of the Namazga VI period of the Fedorovo type at the Andronovo settlement, Pavlovka (Malyutina 1991); Andronovo vessels and an arrow of the Fedorovo type in the Post-Harappan level B of the Shortughai settlement in Afghanistan (Francfort 1989); and numerous mixed complexes of Tajikistan and Uzbekistan combining the wheel-made ware of Namazga VI, the hand-shaped pottery of Fedorovo, and Andronovo metal (Pyankova 1989; 1994; Vinogradova 1994; 2004; Kuzmina, Vinogradova 1996; Kuzmina 1997a; ITN 1998).

The chronology of these complexes is debatable. The Russian archaeologists' dates rest on the European scale and are as follows: Sintashta-Petrovka is assigned to the seventeenth-sixteenth centuries B.C., the Fedorovo complexes to the fifteenth-fourteenth centuries B.C., and the Namazga VI period to the seventeenth-thirteenth centuries B.C., on the basis of the long chronology of Hissar III (Sarianidi 1990). By contrast, American and European scholars adopt calibrated radiocarbon dates: Sarazm IV: 2300–1700 B.C. (Lyonnet 1996); Shortughai level B: 2000–1700 B.C. (Francfort 1989); BMAC: 4000–1800 B.C. (Gibert 1994; Götzelt 1996), which is consistent with a series of radiocarbon dates of the Harappa Culture in India (Possehl 1994).

All these dates radically differ from the traditional chronology of the Steppe sites but correlate well with the new calibrated dates of the Novy Kumak horizon.

The Chinese Line of Synchronization

The numerous common types of metalware demonstrate the active cultural relations of Xinjiang with Ferghana and Semirechye in the thirteenth-ninth centuries B.C. (Debaine-Francfort 1988; 1989; Kuzmina 1998a). Contacts with China in the Shang-Yin period, which were realized through the peoples living to the north and northwest of the East Asian Heartland (EAH), have also been established. They are made manifest in the common types of knives with zoomorphic handles, spears, socketed arrows, mirrors, and Fedorovo gold trumpet-shaped earrings (Varenov 1989; Kuzmina 1994c; Bunker 1998). Finally, which is particularly important, horse chariots are likely to have spread in China under the influence of the Andronovo Culture. The traditional date of the Chinese complexes—fourteenth-thirteenth centuries B.C. and later—correlates well with the traditional Andronovo chronology. The system of synchronization of the earlier sites is not sufficiently advanced to warrant any definite conclusions about East-West contact before that time.

Conclusions Regarding Chronologization and Synchronization

The above analysis has shown that the date of the Novy Kumak horizon sites—seventeenth-sixteenth centuries B.C., determined by the method of analogies and synchronization with European archaeological complexes, conforms with the traditional chronology of the Central Asian farming cultures and is corroborated by the synchronization of the Andronovo complexes of the Fedorovo type with both the Central Asian and Chinese ones. The three independent lines of synchronization coincide.

However, the traditional chronology is at variance with the results obtained through radiocarbon methods: the calibrated dates are several centuries older than the traditional ones. An important point here is that the calibrated dates of the Steppe sites correlate well with the radiocarbon dates of the Southern Asian sites. Hence, there is a systematic difference between the results of the two methods of chronological determination. A refinement of the true age of the Eurasian Steppe sites depends on: (1) advancing the radiocarbon method and bringing its results into line with the historical chronology of Egypt and Mesopotamia; (2) converging the radiocarbon and dendrochronological scales in Europe; (3) refining Mycenaean chronology; and (4) elaborating the synchronization of the Steppe cultures with those of the EAH (China).

At the present time it is proper to use either the traditional method of synchronization or the radiocarbon one, taking into account the difference between these two systems.

Traditional Dates				*Dates According to Carbon 14* (B.C.)		
					Calibrated	
China	*South and East Asia*	*Europe*	*Culture or Site Type*	*Uncalibrated*	*1*	*2*
13–11	13–11	13–11	Alekseevka	13–11		
14–13	15–14	15–14	Fedorovo	16(5)–15(4)		20–17
	15–14	15–14	Timber-Grave	16(5)–15(4)		
	17–16	17–16	Novy Kumak	18–16	23–17	24–20 23–18
			Catacomb	23–21		
			Poltavka	23–21		

Radiocarbon Dates
After G. Posschl (1994)

Monument	*Laboratory*	*5568BP*	*5730 BC*	*Calib-3*	*Culture*
Hissar	Tips-20	3483 ± 63	1635 ± 65	1Σ 1883 2Σ 1945	Hissar III (late level)

After Kircho, Popov (1999, pp. 356–61)

Sample	*Cultural horizon*	*^{14}C age (BP)*	*Calibr. date by Groningen 1.20 (1995); 1Σ cal.* B.C.	*Calibr. date after: Kohl 1984; 1992; CRD 1Σ* B.C.	*Calibr. date after: Hiebert 1994; CRD 2Σ* B.C.
			Ulug-depe		
LE-980	Namazga VI, 2 mill. B.C.	3280 ± 95	1672 . . . -1656 1634 . . . -1440		1749–1324
			Namazga-depe		
LE-665	Namazga VI late	2980 ± 60	1306–1284, 1268–115, 1090–1076		
R 1297	Namazga VI	2870 ± 50		1125–1015	1199–905
R 1298	Namazga VI	3220 ± 40		1665–1415	1498–1269
R 1299	Namazga VI	3240 ± 50		1675–1430	1621–1408
R 1300	Namazga VI	3050 ± 50		1410–1245	1416–1128
R 1300a	Namazga VI	2880 ± 60		1130–1020	1257–901
R 1301	Namazga VI	2960 ± 50		1345–1100	1372–1003
R 1302	Namazga VI	3220 ± 9		1680–1395	1684–1267

Sample	*Cultural horizon*	*^{14}C age (BP)*	*Calibr. date by Groningen 1.20 (1995); 1Σ cal.* B.C.	*Calibr. date after: Kohl 1984; 1992; CRD 1Σ* B.C.	*Calibr. date after: Hiebert 1994; CRD 2Σ* B.C.
R 1303	Namazga VI	2680 ± 50		905–780	1010–546-
R 1304	Namazga VI	3350 ± 50		2005–1770	2021–1742
			Tekkem-depe		
LE-1095	Namazga VI, 2 mill. B.C.	2460 ± 60	760–678, 658–634, 552–468, 462–412		
LE-1603	Namazga VI	4310 ± 40	3012–3004, 2924–2882		
LE-1604	Namazga VI	4950 ± 50	3784–3692, 3672–3666		
LE-1605	Namazga VI	4520 ± 60	3342–3292, 3284–3266, 3240–3104		
LE-1638	Namazga VI	3620 ± 50	2030–1994, 1988–1892		
LE-1639	Namazga VI	3640 ± 50	2116–2088, 2038–1928		
LE-1640	Namazga VI	4330 ± 50	3028–2980, 2930–2884		
LE-1641	Namazga VI	2450 ± 40	756–688, 538–412		
LE-1642	Namazga VI	4630 ± 50	3502–3420, 3380–3346		
LE-1643	Namazga VI	4280 ± 50	2922–2872, 2802–2778, 2714–2708		
LE-1854	Namazga VI	5030 ± 60	3944–3846, 3820–3768, 3726–3724		
LE-1856	Namazga VI	3110 ± 40	1418–1372, 1354–1314		
LE-1857	Namazga VI	5540 ± 60	4454–4416, 4402–4342		
LE-1858	Namazga VI	3660 ± 40	2124–2084, 2042–1968		
LE-1860	Namazga VI	4280 ± 50	2922–2872, 2802–2778, 2714–2708		
LE-1861	Namazga VI	4130 ± 50	2866–2810, 2760–2724, 2700–2612		
LE-2355	Namazga VI	4310 ± 60	3030–2972, 2932–2876, 2796–2784		

Sample	*Cultural horizon*	*^{14}C age (BP)*	*Calibr. date by Groningen 1.20 (1995); 1Σ cal.* B.C.	*Calibr. date after: Kohl 1984; 1992; CRD 1Σ* B.C.	*Calibr. date after: Hiebert 1994; CRD 2Σ* B.C.
		Gonur 1 (north)			
LE-1207	Namazga VI, 2 mill. B.C.	3560 ± 70	1974–1864, 1848–1770		2009–1744
LE-2407	Namazga V late	2180 ± 40	356–288, 250–226, 210–166		
LE-2408	Namazga V late	3510 ± 40	1880–1862, 1850–1762		
LE-2409	Namazga V late	4290 ± 40	2918–2880		
LE-2411	Namazga V late	4200 ± 40	2880–2864, 2812–2744, 2728–2696		
Beta-35125	Namazga V	3630 ± 90			2138–1888
Beta-33560	Namazga V	3580 ± 60	2032–1883		2032–1883
Beta-33561	Namazga V	3520 ± 60	2030–1694		2030–1694
Hel-2964	Namazga V	3750 ± 80	2278–1979		
		Gonur 1 (south)			
Beta-33562	Namazga V	3700 ± 60		2290–1930	2290–1930
Hel-2963		3540 ±		2009–1694	
Hel-2965		3550 ± 80		2009–1740	
Hel-2966		3410 ± 80		1855–1534	
Hel-2967		3380 ± 110		1770–1509	
Hel-2968		3600 ± 80		2031–1776	
Hel-2969		3480 ± 90		1916–1639	
Hel-2970		3380 ±		1766–1524	
		Togolok 21			
LE-2678	Namazga VI	3270 ± 40	1608–1556, 1534–1506, 1482–1456		
LE-2679	Namazga VI	4620 ± 40	3500–3456, 3434–3432, 3378–3342		
LE-2681	Namazga VI	4610 ± 50	3502–3450, 3444–3424, 3380–3334, 3220–3200, 3154–3136		
LE-2682	Namazga VI	5060 ± 40	3942–3896, 3888–3848, 3820–3796		

Sample	*Cultural horizon*	*^{14}C age (BP)*	*Calibr. date by Groningen 1.20 (1995); 1Σ cal.* B.C.	*Calibr. date after: Kohl 1984; 1992; CRD 1Σ* B.C.	*Calibr. date after: Hiebert 1994; CRD 2Σ* B.C.
LE-2683	Namazga VI	3540 ± 40	1914–1904, 1902–1870, 1844–1776		
LE-2684	Namazga VI	4270 ± 40	2914–2876, 2796–2784		
LE-2685	Namazga VI	3540 ± 40	1914–1904, 1902–1870, 1844–1776		
Beta-33564	Namazga VI	3470 ±	1920–1680		1920–1680
		Sapalli-depe			
LE-916	Namazga V late	3640 ± 90		2190–1880	
LE-1078	Namazga V late	3450 ± 50		1895–1690	
?		1560 BC			
		Bustan VI (cemetery)			
LE-4994	2 mill. B.C.	3580 ± 70	2024–2004, 1980–1872, 1842–1776		
LE-4995	2 mill. B.C.	3620 ± 40	2028–2000, 1984–1912, 1906–1900		
LE-4991	2 mill. B.C.	3540 ± 70	1936–1858, 1854–1752		
		Dzharkutan			
?		1650 B.C.			
Beta-33557	2 mill. B.C.	3540 ± 70		2125–1695	2042–1734
		Dashly 3			
LE-978	2 mill. B.C.	3440 ± 50		1890–1685	1882–1617
LE-1175	2 mill. B.C.	3066 ± 70		1425–1255	
LE-1252	2 mill. B.C.	3670 ± 50		2185–1950	2191–1889
LE-1254	2 mill. B.C.	4230 ± 70		2970–2795	
LE-1253	2 mill. B.C.	4060 ± 70		2685–2540	
LE-1251	2 mill. B.C.	3250 ± 40		1680–1435	

RADIOCARBON DATES FOR GRAVES OF THE SOUTH RUSSIAN STEPPES WITH CHARIOTS OR CARTS

Culture	*Site*	*Tradit. chronol.*	*Labor.*	*Non-calibrated*	*Calibr.*
Titarov.	Ostanny				
	b. gr./g. 1/160		LE 2963	4440 + 40 ago	
	Protocatac				
	b. gr./g. 2/12		LE 2962	4270 ± 40 ago	
Pit-Grave	Balkovsky				
	b. gr./g.		KI 606	2420 ± 120 B.C.	
Yam-catac.	Vinogradnoe				
	b. gr./g. 34/34		UB 3133	2210 ± 19 B.C.	
Yam-cat.	Krivoi Rog		UB 3134	2083 ± 19 B.C.	
			UB 3137	2264 ± 25 B.C.	
Pit-catac.	Kamenka		UB 3135	2212 ± 19 B.C.	
	b. gr./g. 1/9		KI 3368	1950 ± 50 B.C.	
			KI 3592	2420 ± 50 B.C.	
Pit-catac.	Korchi		UB 3136	2250 ± 19 B.C.	
	b. gr./g. 20/16		KI 5383	2340 ± 60 B.C.	
Catac.	Mar'evka,				
	b. gr./g. 11/27		KIGN 285	2030 ± 120 B.C.	

RADIOCARBON DATES FOR MONUMENTS OF THE CATACOMB CULTURE IN THE UKRAINE AND KALMYKIYA

Culture	*Site*	*Tradit. chronol.*	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
Catac.	M. Astakhovo IV				
	b. gr./g. 18/8		KI 2090	2190 ± 60	2920–2545
	b. gr./g. 22/3		KI 2809	2230 ± 90	3045–2430
	b. gr./g. 18/9		KI 854	2230 ± 100	3045–2430
	M. Brilevka				
	b. gr./g. 17		KI 2690	1810 ± 70	2515–1980
	b. gr./g. 17		KI 2694	1750 ± 80	2515–1870
	b. gr./g. 17		KI 2692	2450 ± 6033	70–2920
	M. Verkh. Tarasovka				
	b. gr./g. 59/15		KI 896	1800 ± 30	2395–1190
	M. Nikolaevka				
	b. gr./g. 5/4		KI 890	1890 ± 40	2540–2145
	M. Svatovo				
	b. gr./g. 2/2		KI 620	1610 ± 120	2185–1685
	b. gr./g. VIII/I		KI 906	1760 ± 60	2325–1325
	b. gr./g. XII/2		KI 1558	1850 ± 90	2545–1965
	b. gr./g. 4/5		KI 892	1870 ± 35	2545–2145
	b. gr./g. XX/3		KI 1567	1950 ± 50	2685–2185
	b. gr./g. XVI/I		KI 1562	2150 ± 80	2930–2405
	b. gr./g. XII/9		KI 1569	2250 ± 65	3020–2645
	b. gr./g. XVIII/3		KI 1584	2250 ± 80	3145–2550
	b. gr./g. XII/4		KI 1559	2250 ± 80	3145–2550
	M. Starobogdanovka b. gr./g. 1/8		KI 2092	1720 ± 100	2390–1775
	M. Astakhovo		LE	2020 ± 100	
	M. Svatovo				
	b. gr./g. 8/1		SOAN	1880 ± 30	
	M. Nikolaevka				
	b. gr./g. 14		?	1890 ± 40	
	M-ki Kalmykii		IG RAN	3970–3500 B.P.	2480–1850

RADIOCARBON DATES FOR MONUMENTS IN THE VOLGA REGION

Culture	*Site*	*Tradit. chronol.*	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
Late	M. Khvalynsk s. 35		OxA 4310	6040 ± 80 ago	
Ehneolithic	s. 18		OxA 4314	6015 ± 85	
	s. 34		OxA 4313	5920 ± 80	
	s. 24		OxA 4312	5830 ± 85	
	s. 10		OxA 4311	5790 ± 85	
Pit-Grave	M. Nov. Orlyanka I				
	b. gr./g. 1/5		OxA 4254	4510 ± 75	
	M. Kuturluk 1				
	b. gr./g. 4/1		OxA 4306	4400 ± 70	
Poltavka	M. Nov. Orlyanka				
	b. gr./g. 1/4		OxA 4255	4230 ± 80	
Poltavka	M. Lopatino				
	b. gr./g. 33/1		OxA 4307	4075 ± 70	2859–2818
					2874–2799
Poltavka					2693–2679
					2779–2712
					2541–2492
					2708–2461
Srubna	M. Spiridonovka II		OxA 4259	3490 ± 70	
	b. gr./g.1/10				
Pokrovka	b. gr./g. 1/6		OxA 4260	3490 ± 70	
Srubna	Studentsy 1 b. gr./g. 2/1		OxA 4258	3450 ± 70	
Srubna	M. Nov. Orlyanka b. gr./g. 2/1		OxA 4305	3400 ± 70	
Late Bronze	M. Studentsy b. gr./g. 1/2		OxA 4257	3350 ± 70	
Suskan	M. Nov. Orlyanka b. gr./g. 1/3		OxA 4256	2870 ± 70	
Ivanovka	M. Spiridonovka b. gr./g. 1/1		OxA 4261	2840 ± 80	

RADIOCARBON DATES FOR MONUMENTS OF PETROVKA–POTAPOVKA TYPE IN THE VOLGA REGION, URALS, AND KAZAKHSTAN

Culture	*Site*	*Tradit. chronol.* B.C.	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
Potapov.	M. Utevka VI b. gr./g. 6/4	seventeenth century	OxA 4262	3510 ± 80	1925–1721 2041–1620
	s. 6/6		OxA4263	3470 ± 80	1876–1678 1981–1551
	s. 6/6		Oxa 4264	3585 ± 80	2032–1800 2141–1709
Potapov.	M. Potapovo 1, b. gr./g. 5/13		Oxa 4265	3710 ± 80	2220–1981 2360–1881
Potapov.	b. gr./g. 5/3		OxA 4266	3510 ± 80	1925–1721 2041–1620
Petrov. M.	M. Krivoe Ozero		AA9874A	3580 ± 50 ago	1973–1789 2036–1752
			AA9874B	3740 ± 50	2197–2038 2286–1975
			AA9875A	3700 ± 60	2179–1976 2278–1995
			AA3525B	3525 ± 50	1906–1749 1972–1690
Petrov.	M. Satan	sixteenth century	LE 2320 (PS)	1420 ± 160 B.C.	1575–1255

RADIOCARBON DATES FOR MONUMENTS OF ANDRONOVO CULTURE IN THE URALS, KAZAKHSTAN, AND SIBERIA

Culture	*Site*	*Tradit. chronol.* B.C.	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
Andron.	M. Verkhnyaya Alabuga, s. 29		LE 14233	3000 ± 40	
			LE 1424	3030 ± 60	
			LE 1425	3710 ± 40	
Andron.	S. Korkino 1		LE 1474	5220 ± 70	
			LE 1541		
			LE 1542		
			LE 1543		
			LE 1544		
Andron.	M. Titovo (Kemer. obl.) b. gr./g. 6		LE 2663	2840 ± 40	
	b. gr./g. 5		LE 2664	2910 ± 40	
	b. gr./g. 6 s. 3		LE 2665	3000 ± 40	
	s. 2		LE 2666	2900 ± 40	
	s. 4		LE 2667	2690 ± 40	
	s. 2		LE 2668	2820 ± 40	
	s. 2		LE 2669	2560 ± 40	

Culture	*Site*	*Tradit. chronol.* B.C.	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
	b. gr./g. 5 s. 1		LE 2670	2850 ± 40	
	b. gr./g. 6 s. 3		LE 2671	2940 ± 40	
	b. gr./g. 6 s. 3		LE 2672	2980 ± 40	
	b. gr./g. 6 s. 2		LE 2676	2890 ± 40	
				2640 ± 40	
Andron.	Karakol (Kirgizstan)		LE 1203	2810 ± 40	
Alak.	M. Khripunovo			end nineteenth–beginning eighteenth centuries	
				eighteenth century	
Alak.	M. Chistolebyazh'e		UPI 562		
	b. gr./g. 9/1			673 ± 35	
	b. gr./g. 9/1		UPI 597	1816 ± 43	
	b. gr./g. 10/1		UPI 570	1430 ± 60	
	b. gr./g. 10/1		UPI 571	1540 ± 50	
	b. gr./g. 13/3		UPI 563	1939 ± 39	
	b. gr./g. 13/4		UPI 565	1934 ± 39	
Fedor.	S. Cheremukhovyi-kust		UPI 568	2300 ± 160	
			UPI 560	1496 ± 95	1890 ± 114
			UPI 564	1330 ± 30	1710 ± 107
			UPI 569	1655 + 53	2097 ± 82
Fedor.	M. Turina Gora s. 49	fourteenth–thirteenth	SOAN 2562	1750 ± 25	
	s.52		SOAN 2561	1620 ± 20	
	Bykovo III s. 15		GTN 4846	1140 ± 50	1500 ± 50
Aleksev.	S. Sargary	twelfth–thirteenth		2700 ± 60	

RADIOCARBON DATES FOR MONUMENTS OF ALTAI

Culture	*Site*	*Tradit. chronol.* B.C.	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
Eneolithic	M. Elo	end fourth–beginning third millennium	UPI	3130 ± 50	
Eneolithic	M. Mysskaya		UPI	6 dates eighteenth–fifteenth centuries	

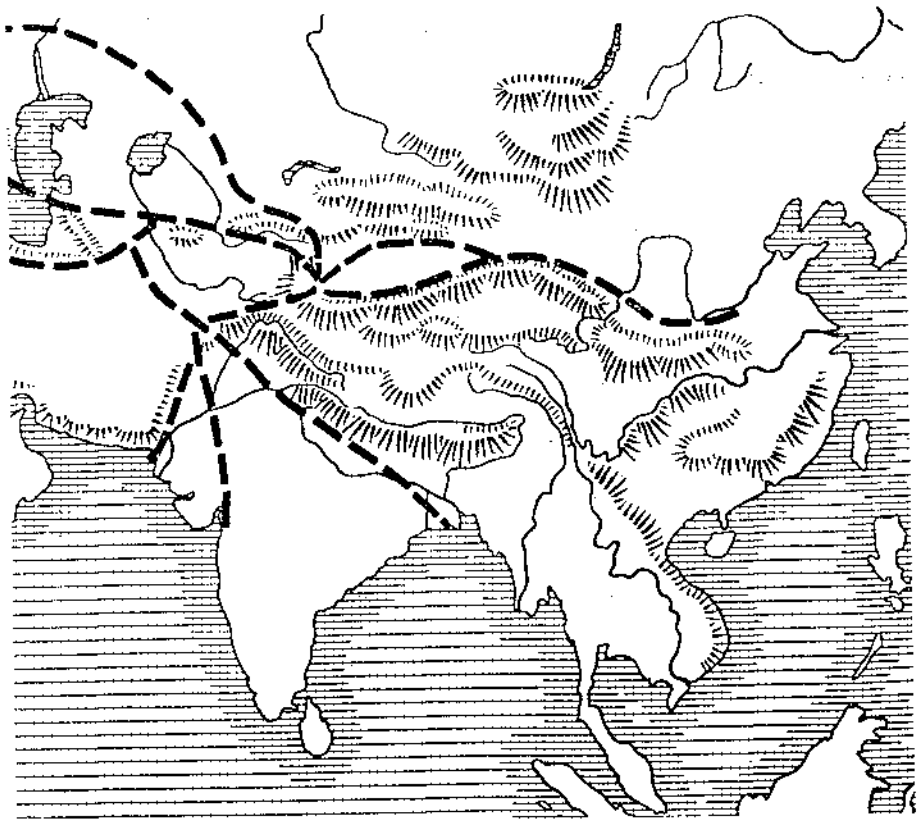
Culture	*Site*	*Tradit. chronol.* B.C.	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
Elunino	M. Elunino, s. 2	eighteenth–fifteenth	SOAN 1893	1610 ± 30	
Elunino	S. Korov'ya Pristan' III		SOAN 2192	1680 ± 75	
Elunino	S. Tsyganskaya	fifteenth–fourteenth	GIN 4845	1510 ± 90	

Radiocarbon Dates for Monuments of Siberia

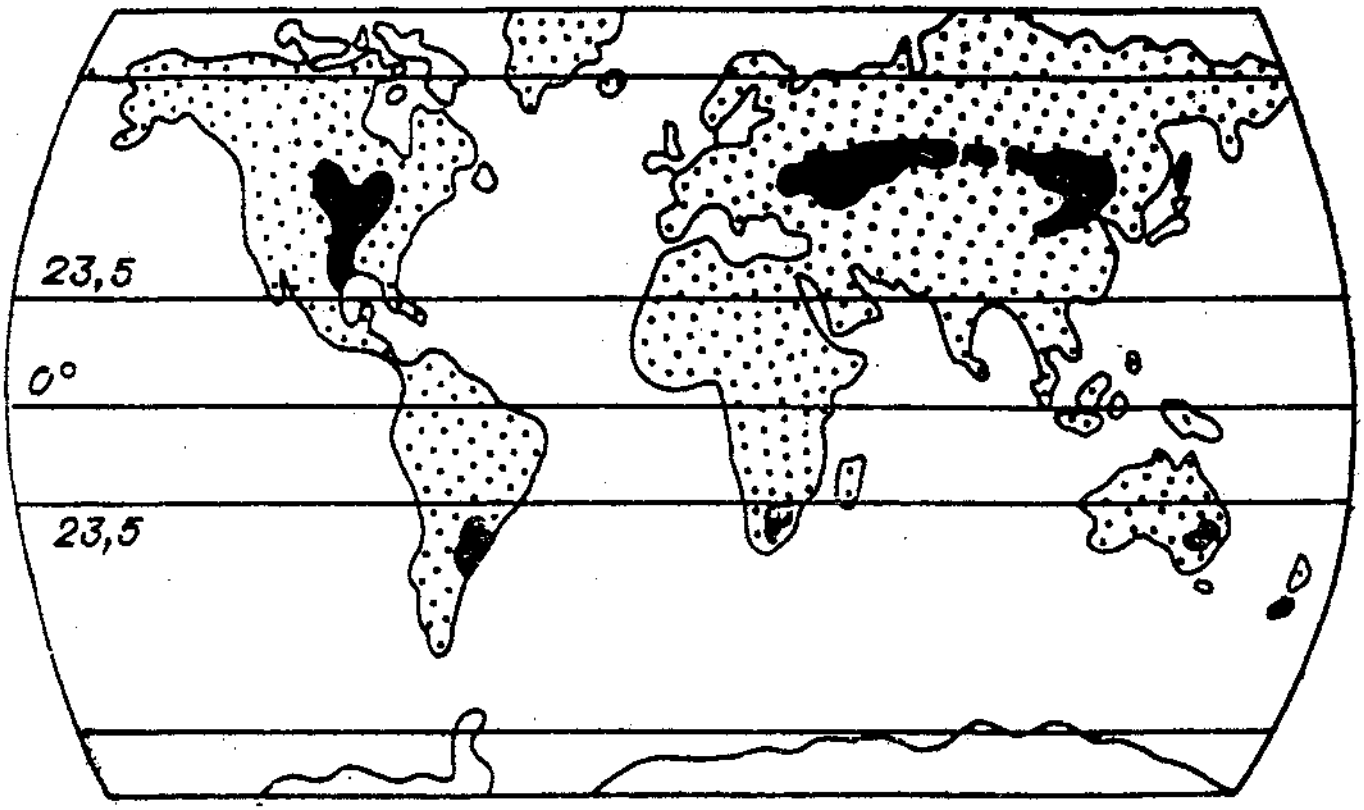
Culture	*Site*	*Tradit. chronol.* B.C.	*Labor.*	*Non-calibrated* B.C.	*Calibr.* B.C.
Eneolithic	M. Staroe musul'man. kladb.	twentieth–seventeenth	SOAN 2393	3625 ± 230 3670 ± 100	
Afanasievo	M. Minusinsk	second half third–middle second millennium twenty-third–eighteenth		16 dates from fourth to first half second millenium 9 dates twenty-fifth–twenty-second centuries 3 dates twentieth–eighteenth centuries 4 dates twenty-ninth century	
	M. Krasnyi Yar,				
	f. 7		LE	2130 ± 40	
	f. 9		LE	2220 ± 50	
	f. 12		LE	2290 ± 60	
	f. 16		LE	2210 ± 40	
	M. Sargov Ulus		LE	2320 ± 60	
	M. Mal. Kopeny		LE	2490 ± 150	
	M. Vostochnoe		LE	1930 ± 30	
	M. Chernovaya VI		LE	1750 ± 80	
	M. Karasuk III		LE	1520 ± 200	
Okunevo	M. Uibat V, b. gr./g. 1	eighteenth–fifteenth	Geidel'	1880 ± 25	2220 ± 50

Abbreviations:
b. gr. burial ground
f. fence
g. grave
Labor. laboratory
obl. oblast (district)
s. settlement
Yam-cat. Pit-Grave Culture, Catacomb Culture

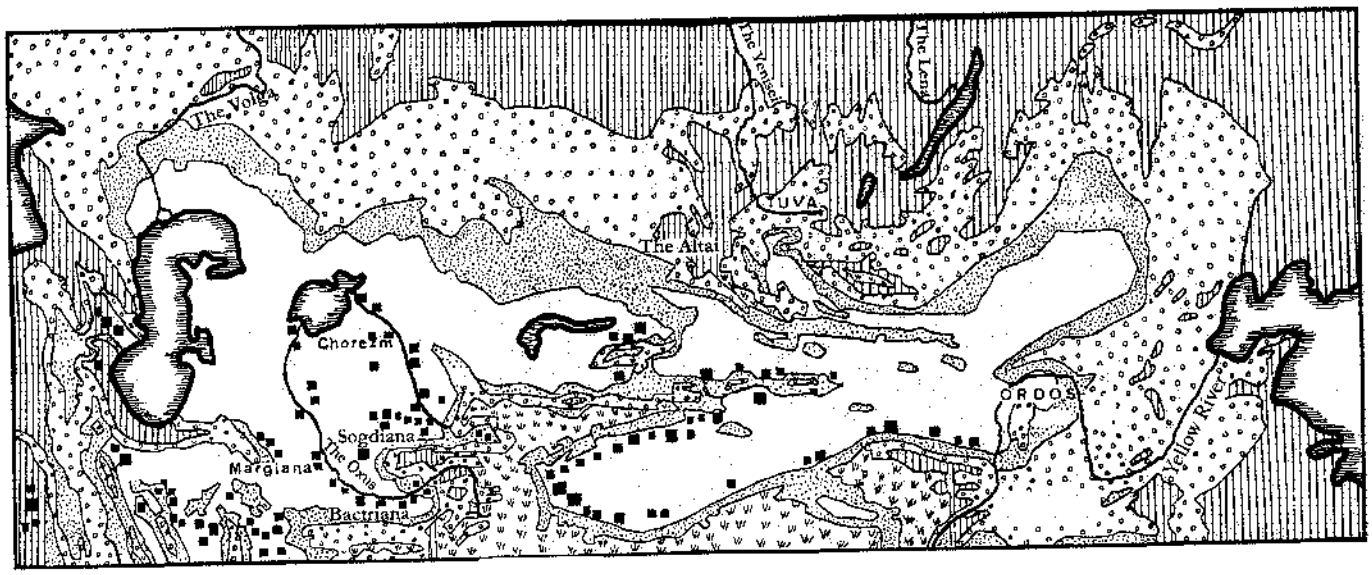
Maps and Illustrations



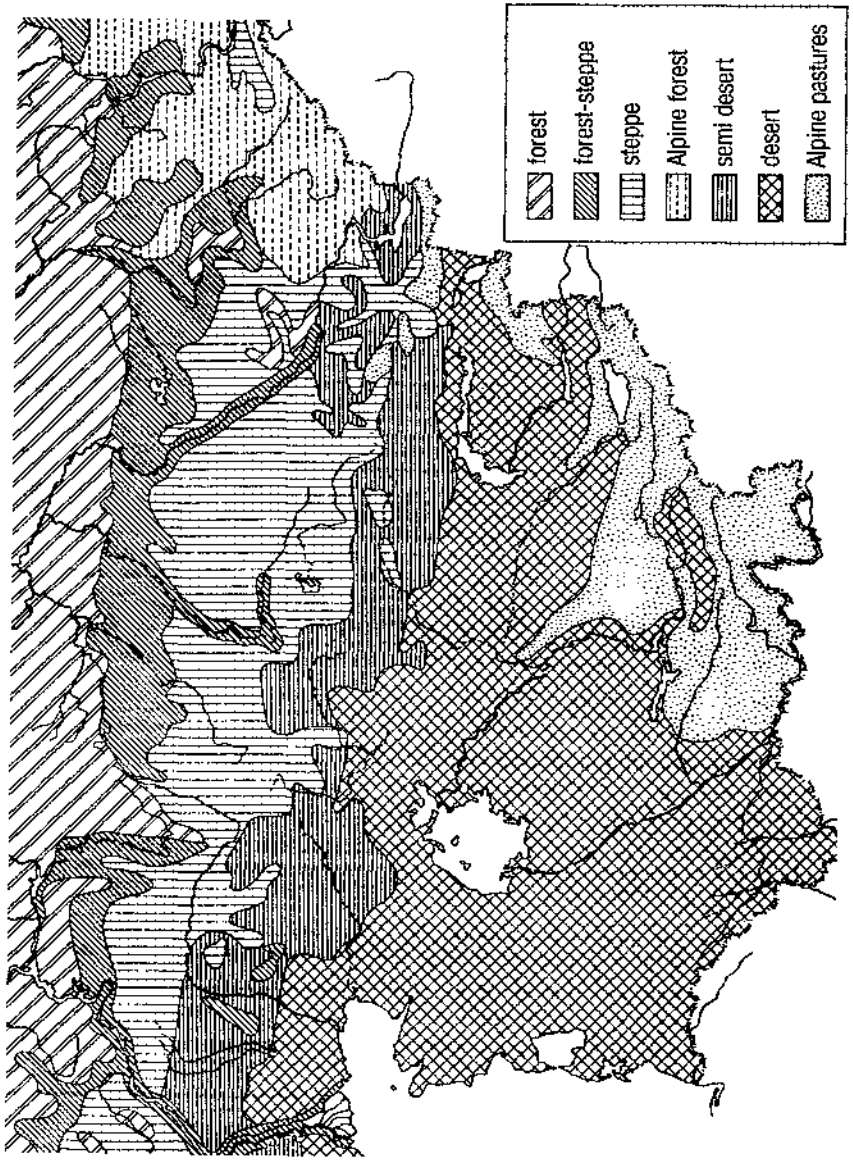
Map 1. The Great Silk Road (after Petrov 1955, fig. 12)



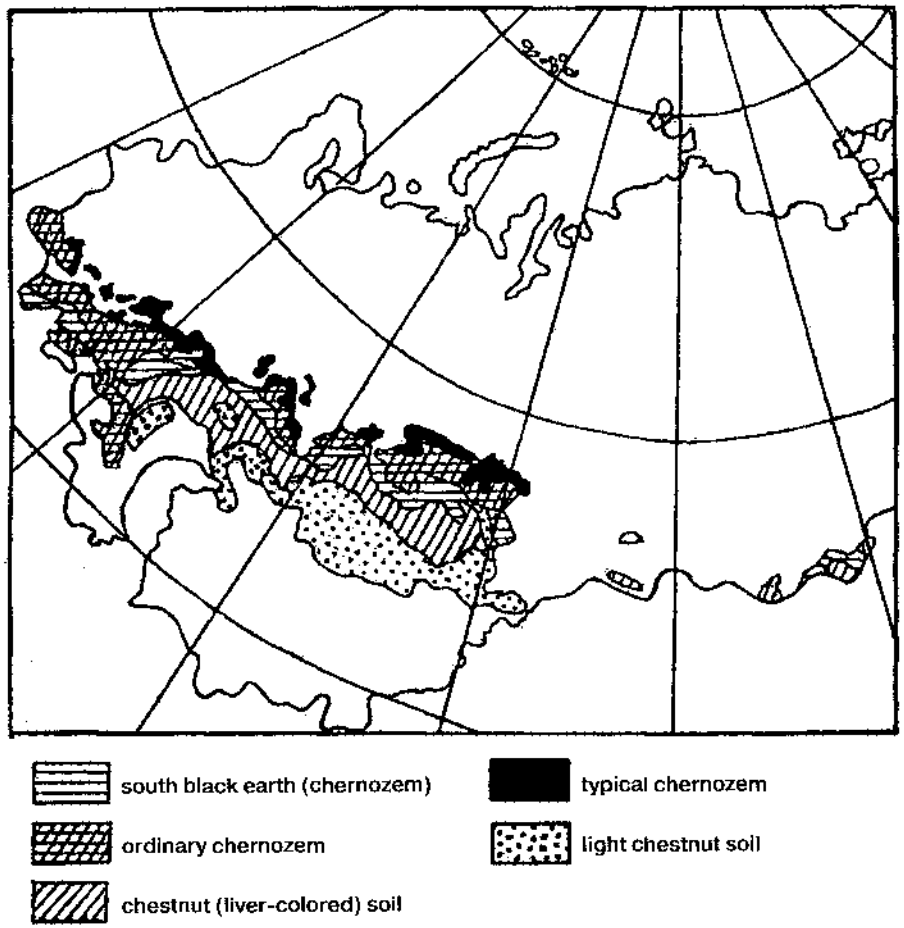
Map 2. Steppes of the Globe (after Mordkovich 1982, fig. 1)



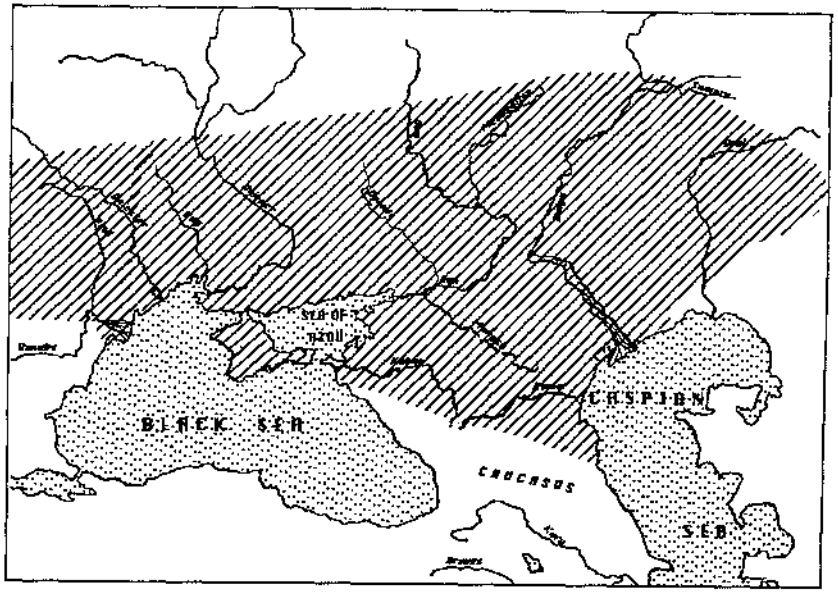
Map 3. Ecological zones of Asia (after Jettmar 1970, plate 4)



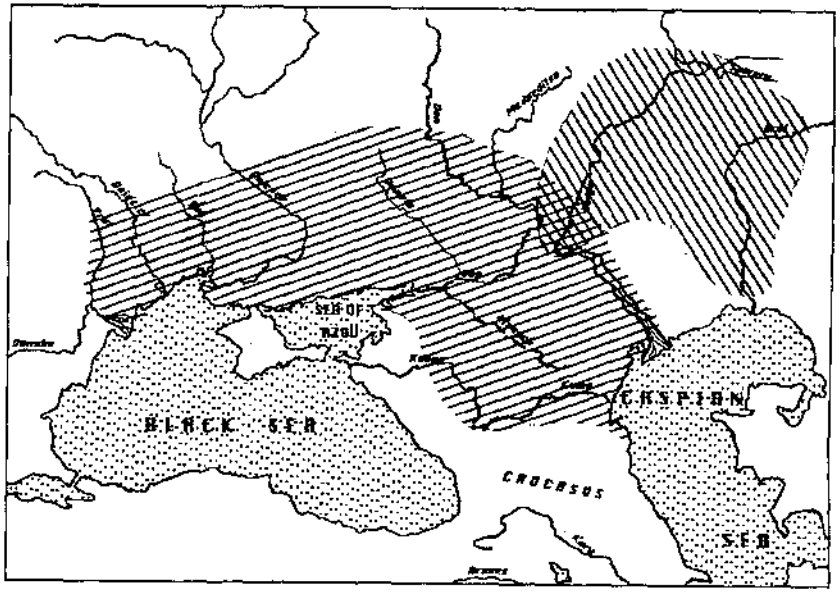
Map 4. Ecological zones of the Andronovo Culture



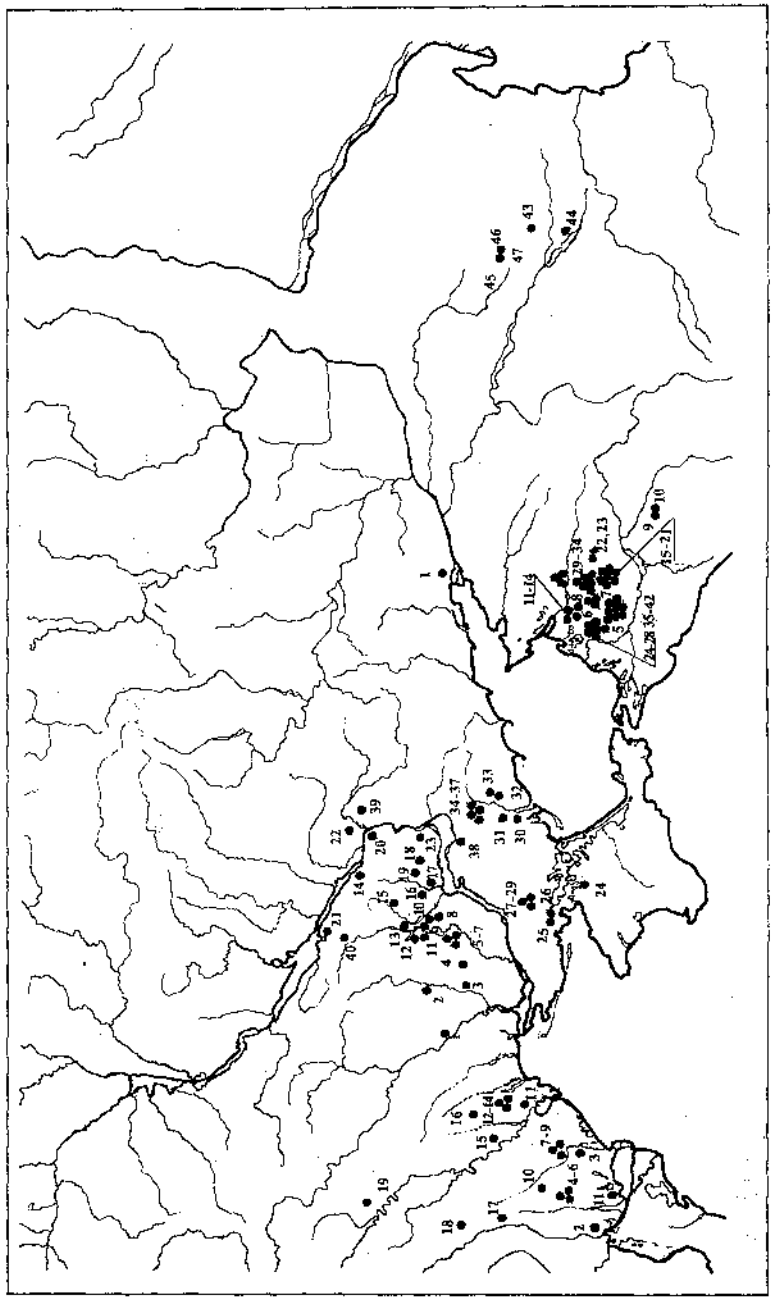
Map 5. Soils of Eurasian steppes (after Mordkovich 1982, fig. 2)



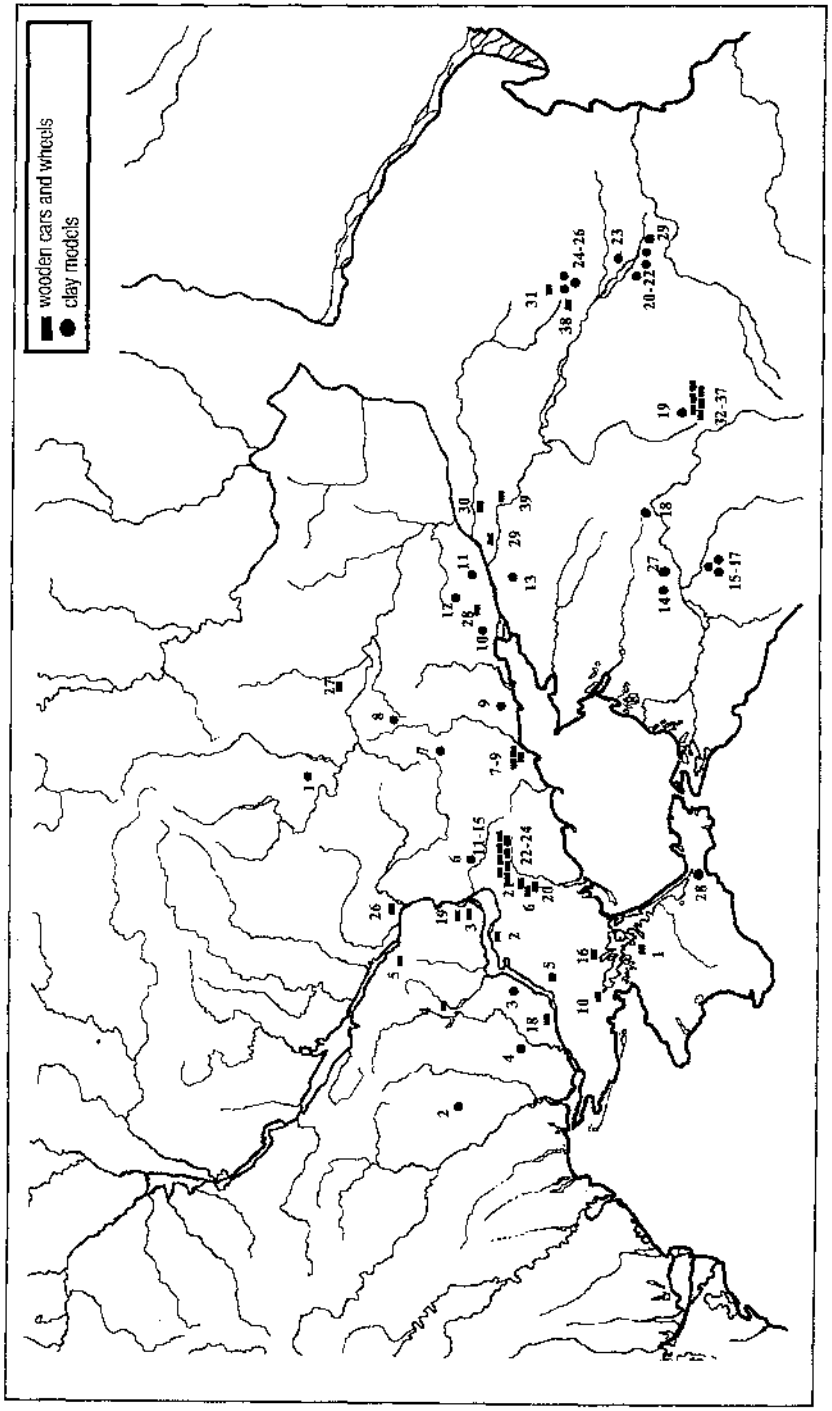
Map 6. Area of the Pit-Grave Culture (after Jones-Bley 1999, fig. 2)



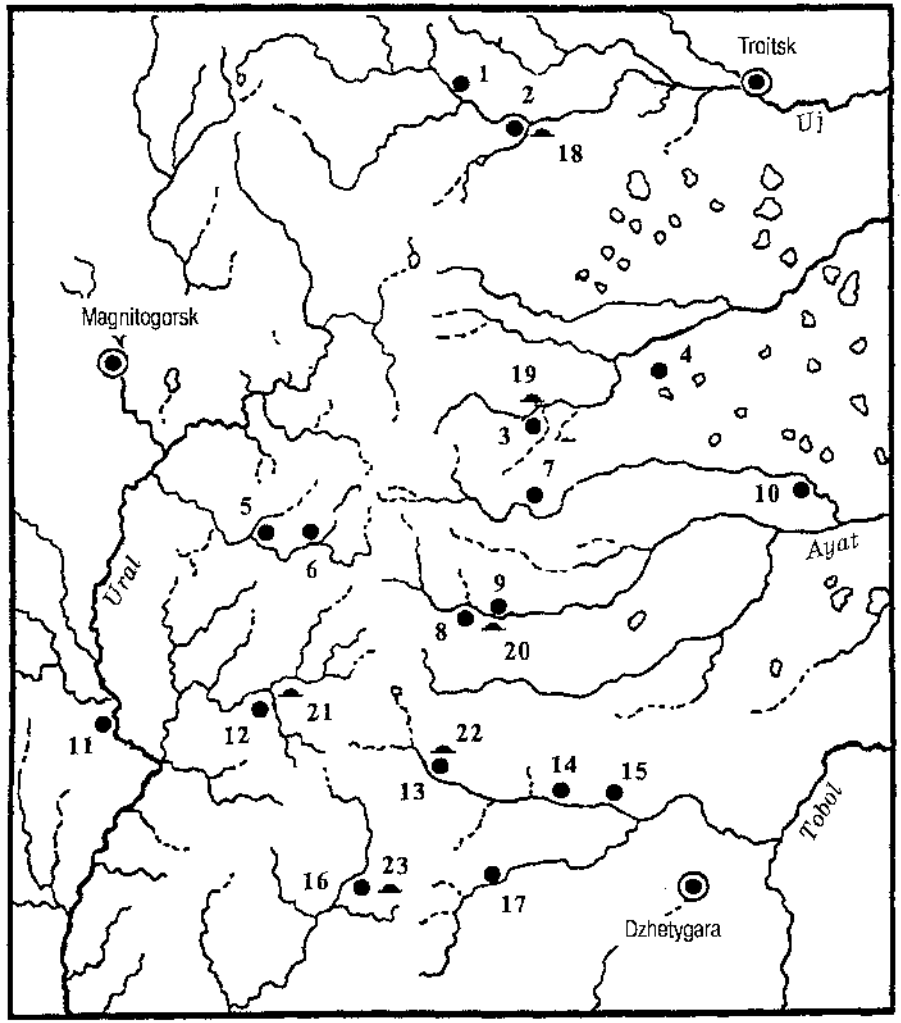
Map 7. Area of Catacomb and Poltavka cultures (after Jones-Bley 1999, fig. 3)



Map 8. Wooden cars with solid wheels, Pit-Grave Culture (after Kul'baka and Kachur 2000, fig. 5)



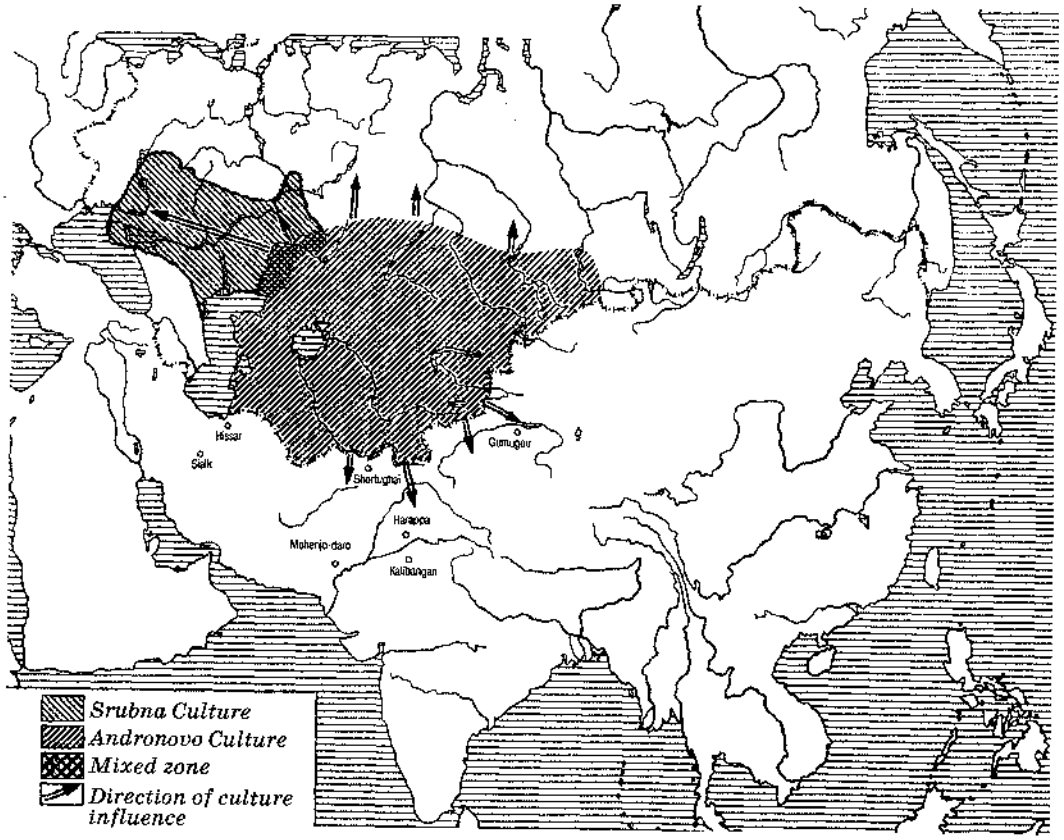
Map 9. Wooden cars and wheels and clay models of cars, Catacomb Culture (after Kul'baka and Kachur 2000, fig. 6)



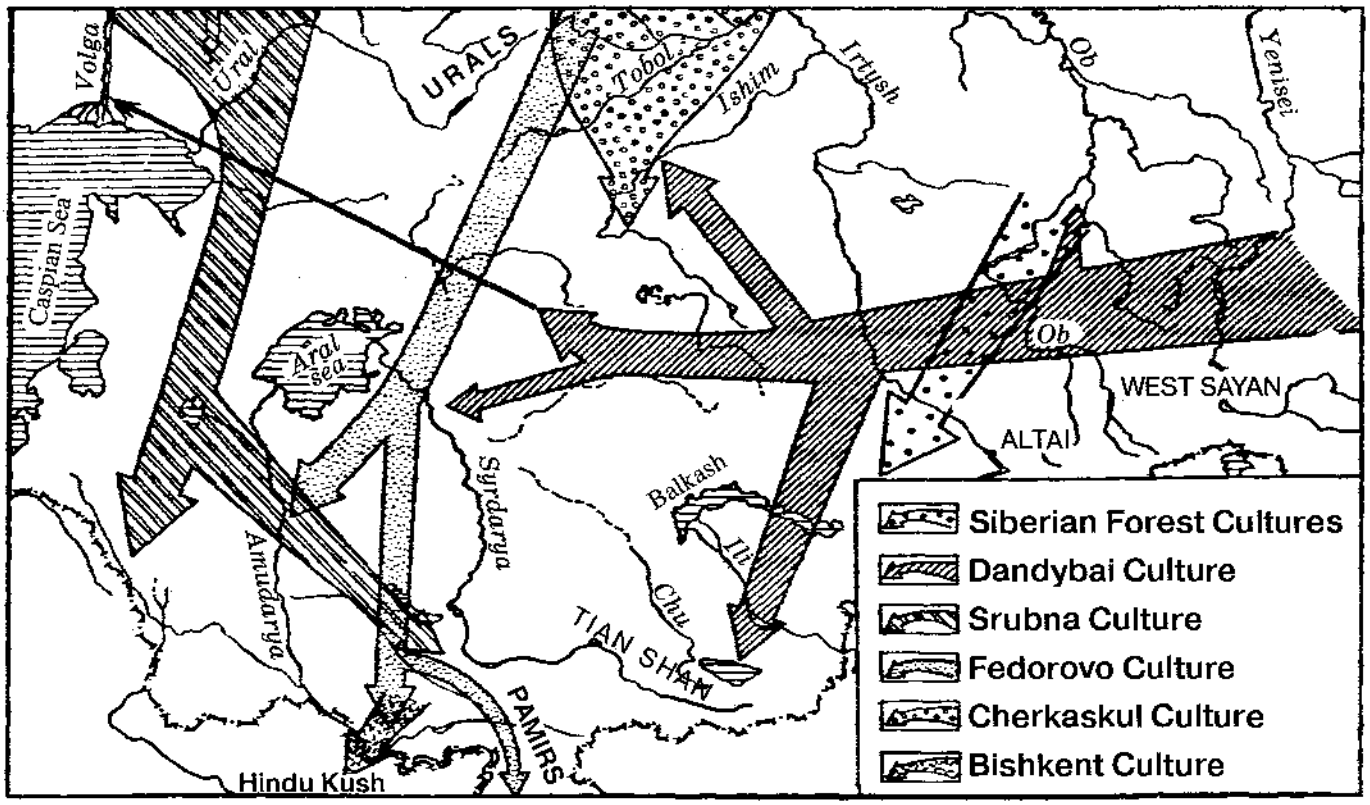
Map 10. Sintashta-type monuments, the Urals (after Epimakhov 2003, fig. 1).

Settlements: 1–Stepnoe; 2–Chernorechie III; 3– Ustie; 4–Chekatai; 5–Kuisak; 6–Sarym-Sakly; 7–Rodniki; 8–Zhurumbai; 9–Ol'gino; 10–Isenei; 11–Kiz-il'skoe; 12–Arkaim; 13–Sintashta; 14–Andreevo; 15–Selentash; 16–Alandskoe; 17–Yagodnyi Dol

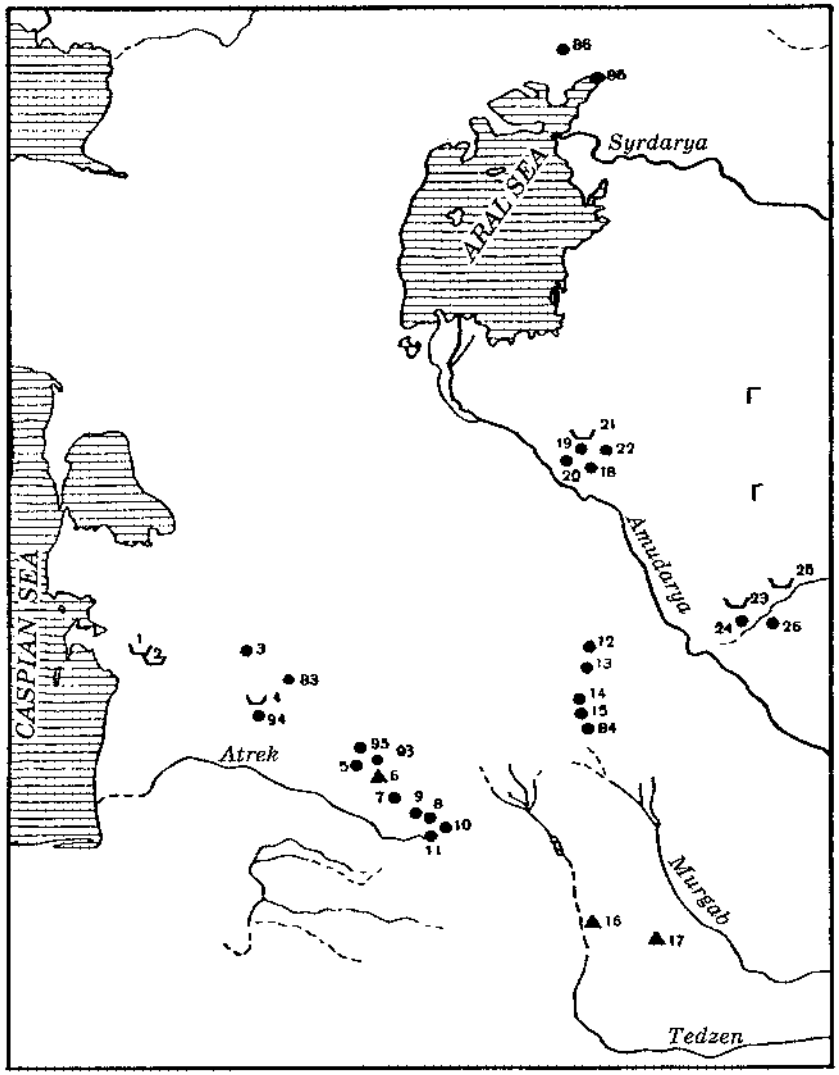
Cemeteries: 18–Krivoe Ozero; 19–Solntse II; 20–Kamennyi Ambar V; 21–Bolshekaraganskii; 22– Sintashta; 23–Solonchanka Ia



Map 11. The place of Andronovo and Srubna cultures in the Old World

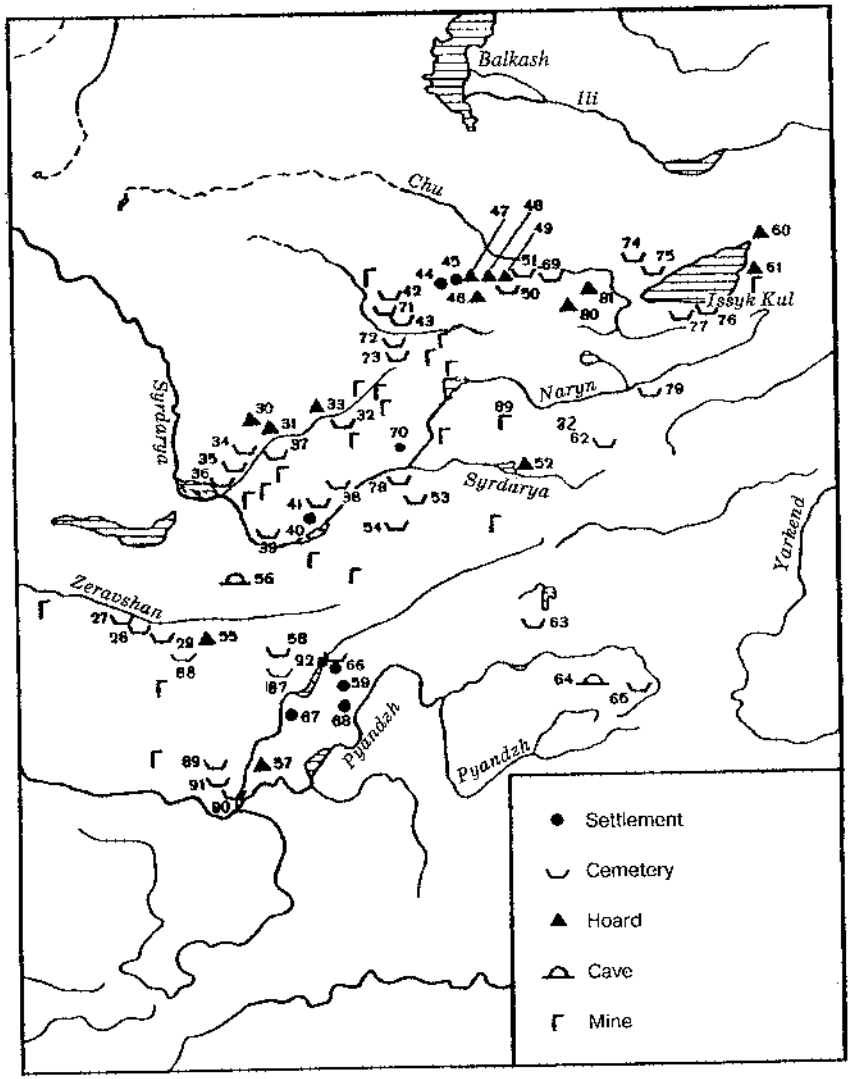


Map 12. Migrations of groups in the Final Bronze Age



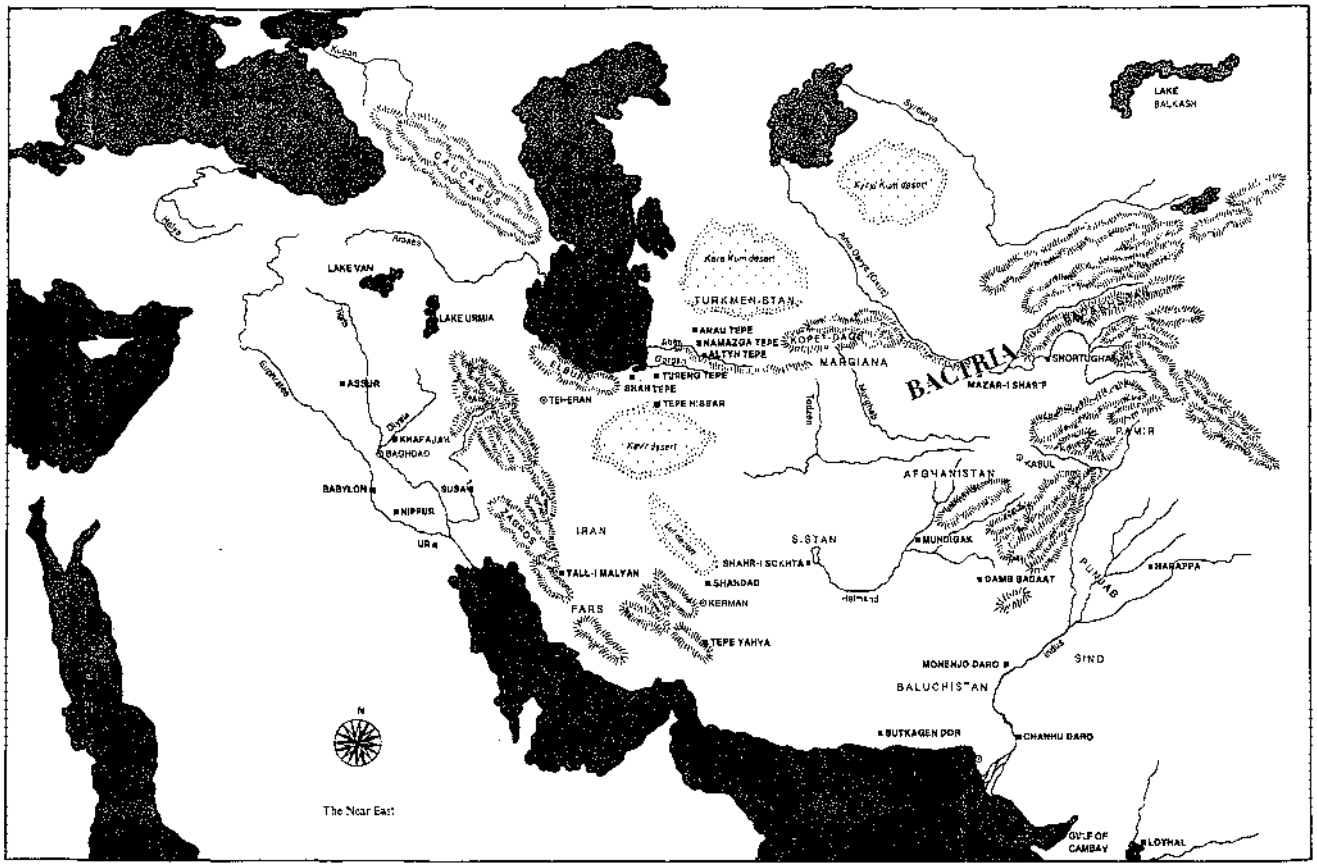
Map 13. The main sites of pastoral groups in Central Asia

1—Karalemata-sai; 2—Patma-sai; 3—Bala-Ishim; 4—Parau; 5—Ovadan; 6—Ashkhabad; 7—Anau; 8—Namazga; 9—El'ken; 10—Sermancha; 11—Tekkem; 12—Taip; 13—Gonur; 14—Auchin; 15—Takhirbai 2,3; 16—Kuin-Kuyu; 17—Imam-Baba; 18—Angka; 19—Kavat 2; 20—Kavat 3; 21—Kokcha 3; 22—Kokcha 1; 23—Gurdush; 24—Gudzhaili 1-9, Bol'shoi i Malyi Tuzkan, Tri Kruga; 25—Kyzyl-Kyr; 26—Pajkent 1-10; 27—Muminabad; 28—Chakka; 29—Urgut; 30—Iskander; 31—Chimbailyk; 32—Aurakhmat; 33—Brichmulla; 34—Nikiforovskii; 35—Yangi-Yul'; 36—Vrevskaya; 37—Orekhovskoe; 38—Dashti-Asht; 39—Khodzhi-Yagona; 40—Kairak-Kumy; 41—Dakhana; 42—Tash-Tyube; 43—Tash-Bashat; 44—Kainda; 45—Dzhail'ma; 46—Sadovoe; 47—Aleksandrovskoe; 48—Sukuluk I, II; 49—

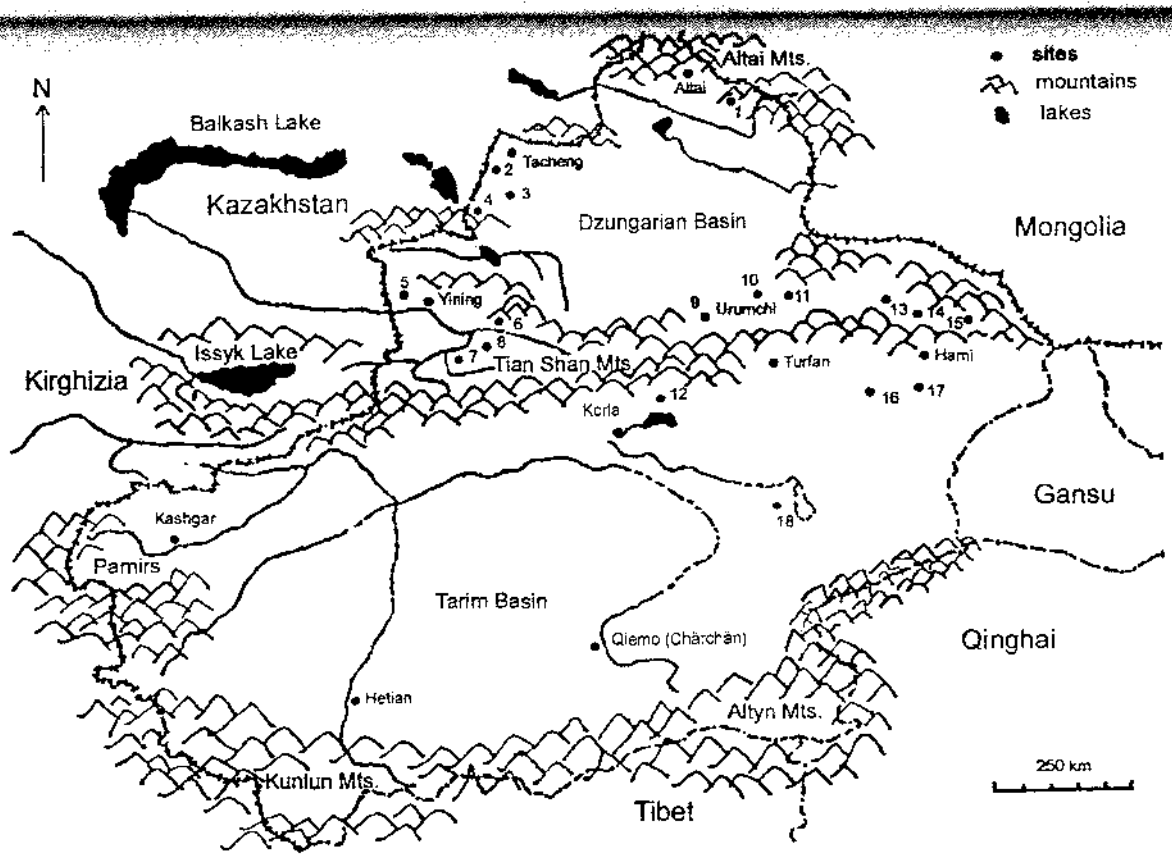


Map 13 Continued

Novopavlovka; 50—Tegermensai; 51—Prigorodnoe grave; 52—Uzgen; 53—Karamkul'; 54—Vuadil'; 55—Iskanderkul'; 56—Ak-Tangi; 57—Dzhilikul'; 58—Tandyriul; 59—Kangurt-Tut; 60—Issyk-Kul' (Tyup); 61—Karakol I-II; 62—Arpa; 63—Kokuibel'-su; 64—Kurteke; 65—Kzyl-Rabat; 66—Teguzak; 67—Sovkhoz Kirova; 68—Karim-Berdy; 69—Alamedinskoe; 70—Dzhal-Aryk; 71—Kulan-sai; 72—Kyzyl-sai; 73—Besh-Tash; 74—Novorossiiskii; 75—Chon-Kemin; 76—Kekelik-sai; 77—Ton I; 78—Dzhazy-Kechu; 79—Chyrgail; 80—Tuyuk; 81—Shamshi; 82—Saimaly-Tash; 83—Kzyl-Arvat; 84—Yaz-depe; 85—Aral'sk; 86—Saksaul'skaya; 87—Kumsai; 88—Dashti-Kozi; 89—Beshkent II; 90—Tigrovaya Balka; 91—Tulkhar; 92—Nurek; 93—Dzheitun; 94—Parau; 95—Bezmein; 96—Dashly 3; 97—Togolok 15; 98—Dzharkutan



Map 14. Migrations of Indo-Iranian groups in the Near East, Central and South Asia (after Ligabue and Salvatori 1998, fig. 1)



Map 15. Monuments of Xinjiang (after Mei, Shell 1999, fig. 1)
1–Keremchi; 2–Chöchäk [Tacheng]; 3–Toli; 4–Saz; 5–Yining; 6–Nilqa; 7–Agharsin; 8–Künäs [Xinyan]; 9–Ürümchi; 10–Jimsar; 11–Guchung [Qitai]; 12–Yengidala [Xintala]; 13–Kök-turaq [Lanzhouwanzi]; 14–Küysu; 15–Qaraüzhmä [Ka'ersang]; 16–Qizilchoqa, Qaradöwä [Wupu]; 17–Qumul [Hami]; 18–Qäwrighul [Gumugou]

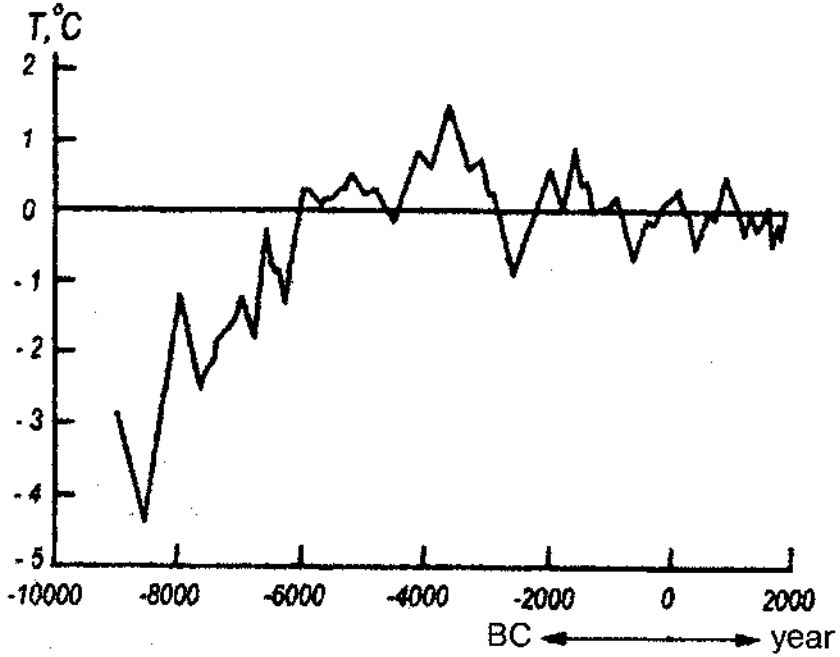


Figure 1. Temperature changes in the northern hemisphere (after Klimenko et al. 1996, fig. 2)

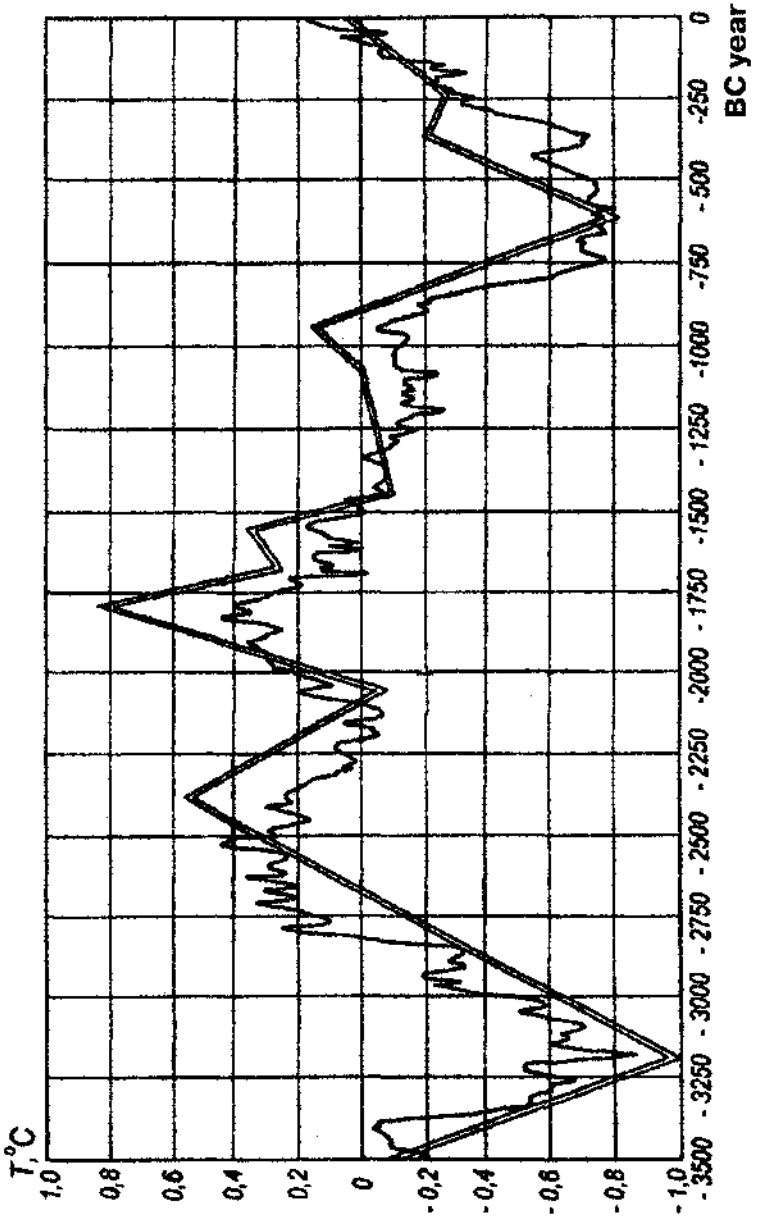


Figure 2. Reconstruction of temperature changes in the northern hemisphere (after Klimenko et al. 1998, fig. 1)

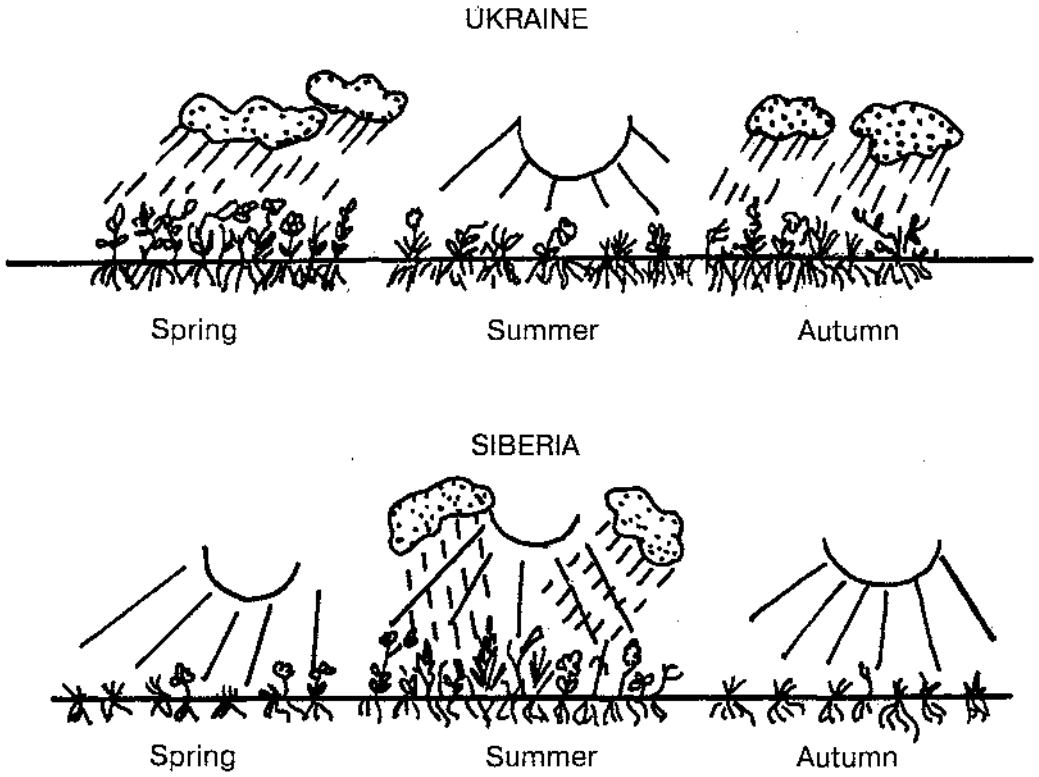


Figure 3. Seasonal rhythm of precipitation falling in the Eurasian Steppes (after Mordkovich 1982, fig. 6)

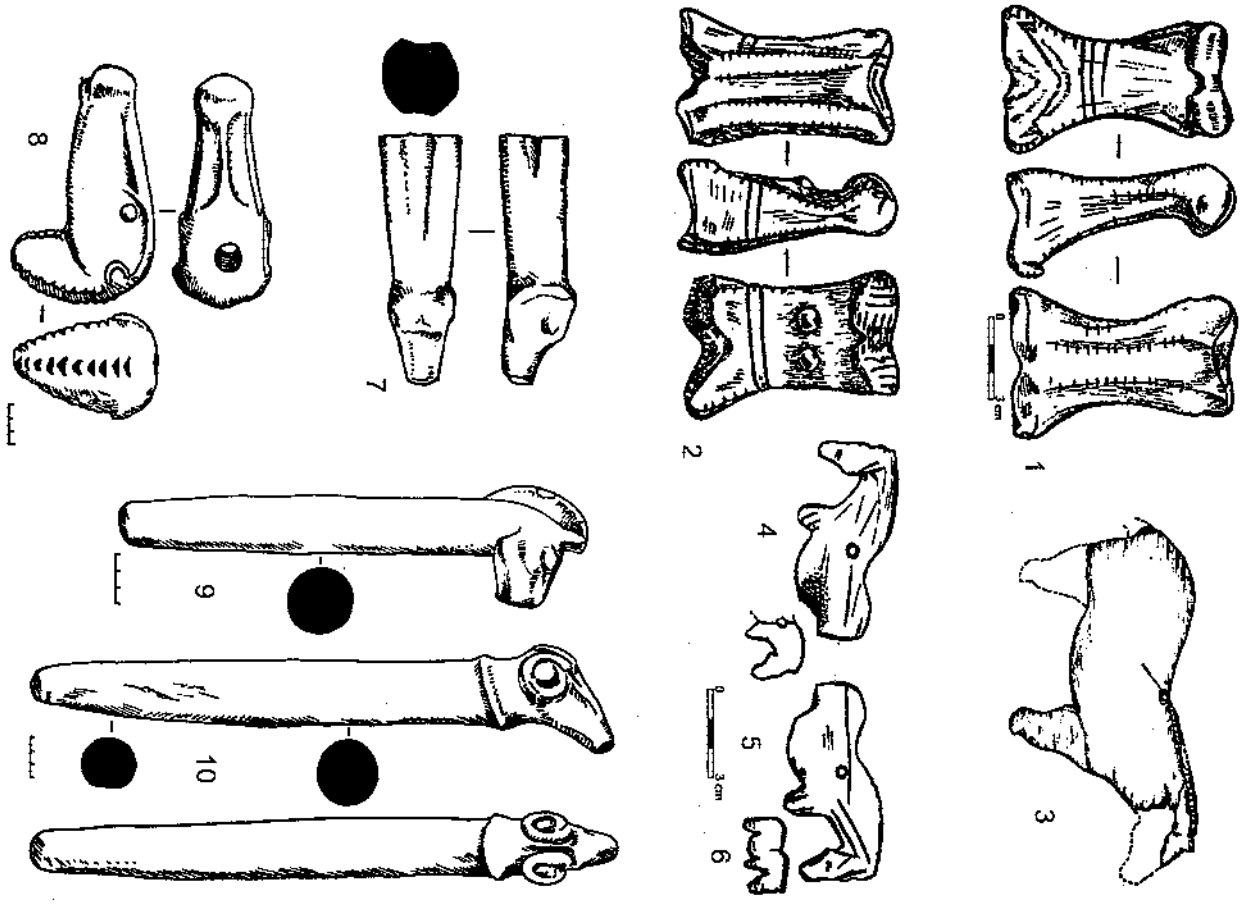


Figure 4. Hobble bones (large phalanges) of a horse with incision; depiction of horse and warders (10–ram)
1, 2, 4–7–Varfolomeevka Neolithic site; 3–Syezzhee Eneolithic cemetery (the Volga region); 8–Orenburg (the Urals); 9, 10–Shipunovo, Early Bronze Age (Siberia); (1, 2, 4–6–bone; 3–boar fang; 7–10–stone)

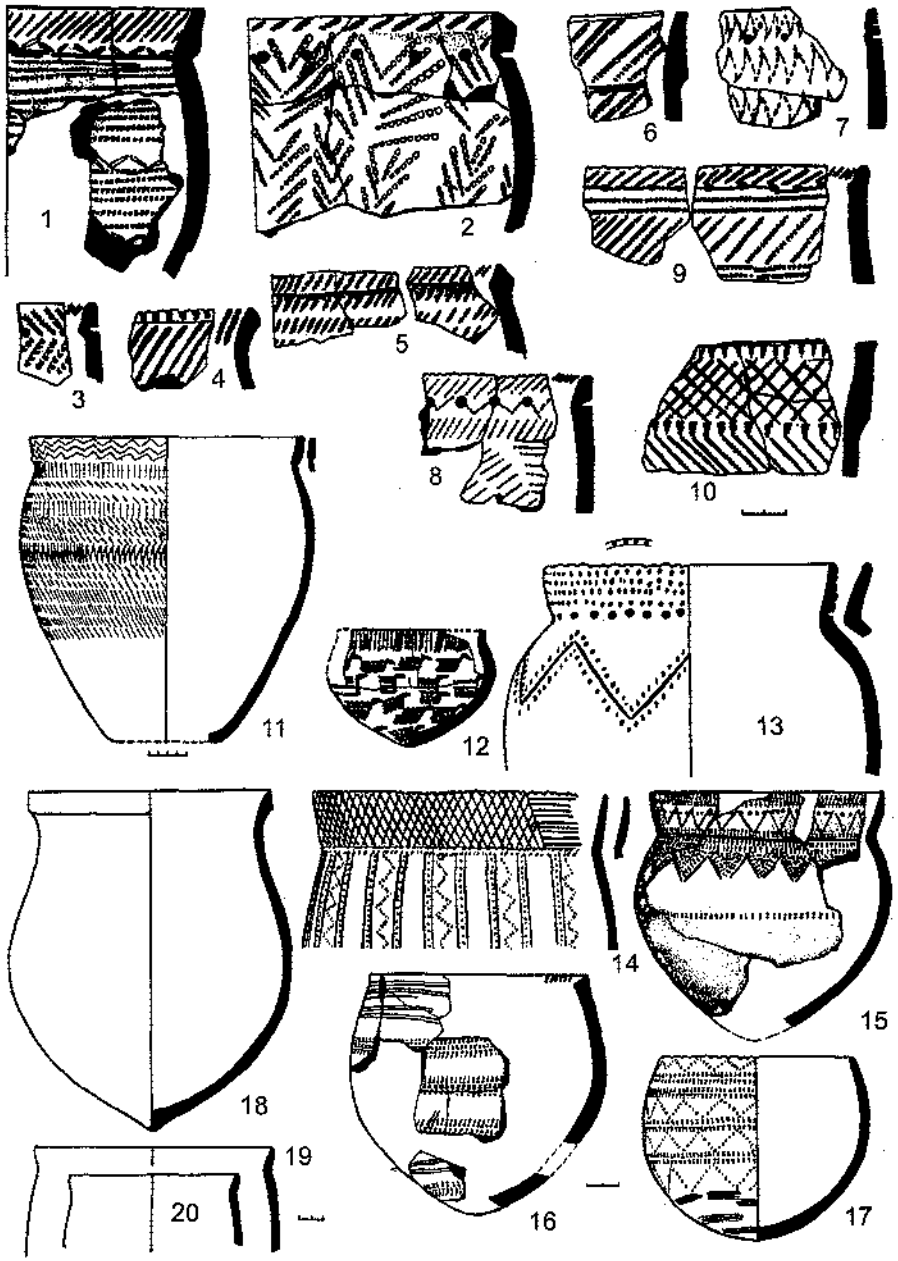


Figure 5. Eneolithic pottery
1–11—Turganik site, Syezzhee type; 12—Late Eneolithic burial mound Ishkinovka; 13–17—Ivanovka site (the Urals)

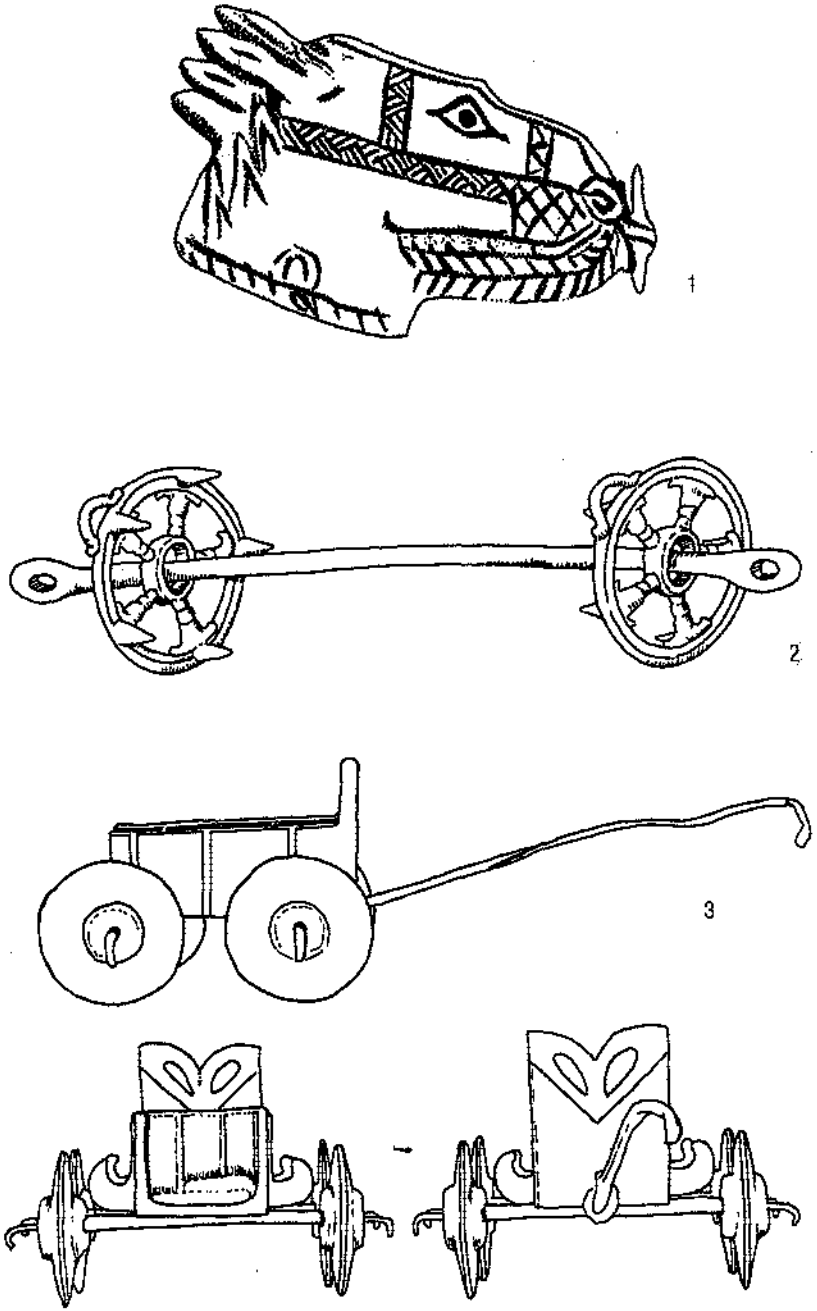


Figure 6. Transport in the Near East
1—Equid kunga (cross between an onager [female] and an ass [male]) with nose ring and kapzug (device for preventing equids from biting while being harnessed) Mari; 2—bronze bit for harnessing Syrian ass (Tell el Ajjul); 3—metal model of car (Paris, Louvre)

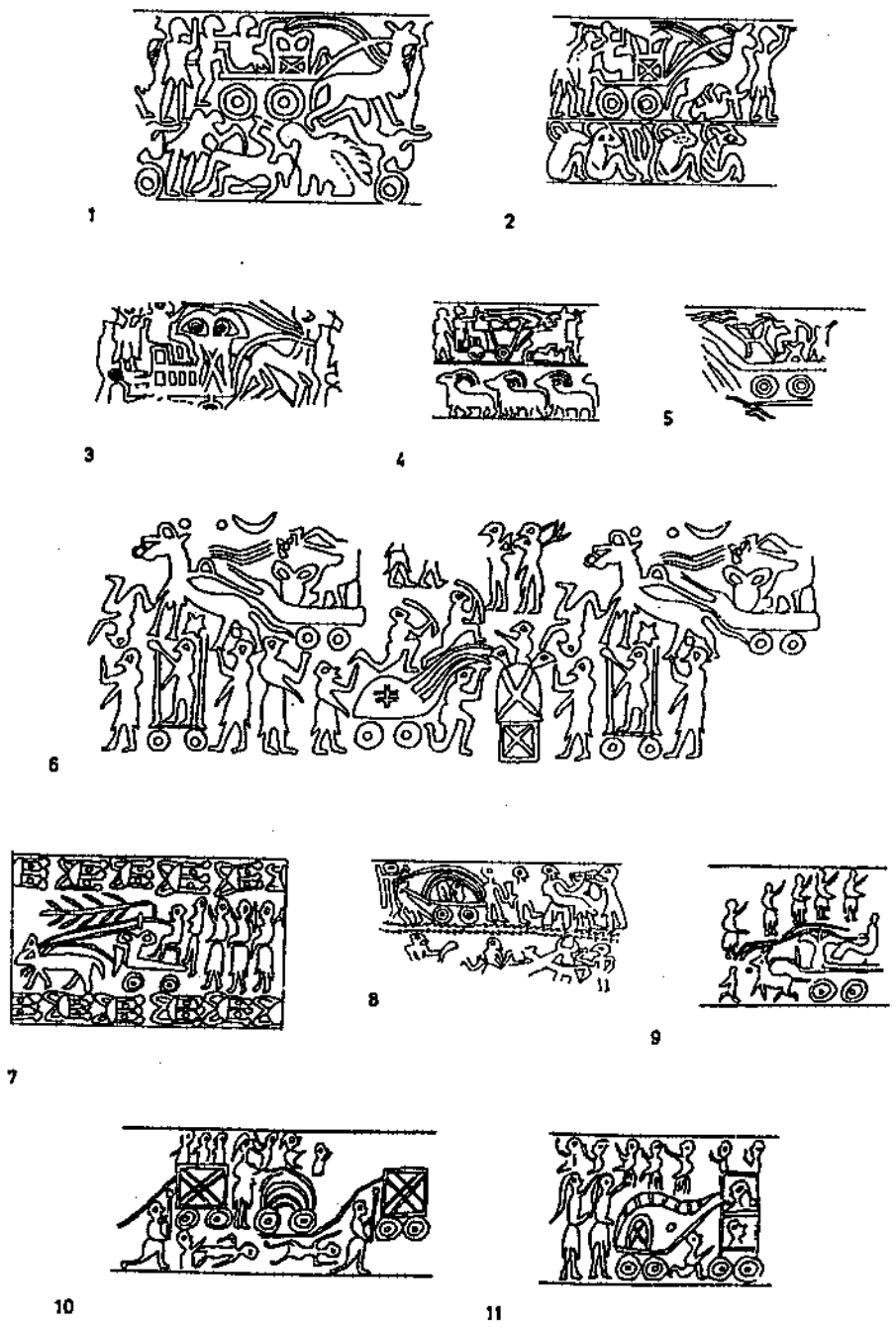


Figure 7. Seal impressions with representations of four-wheeled cars
1–4—Tell-Brak (Nagar c. 1250 B.C.); 5–11—Tell-Beydar (c. 2400–2250 B.C.)

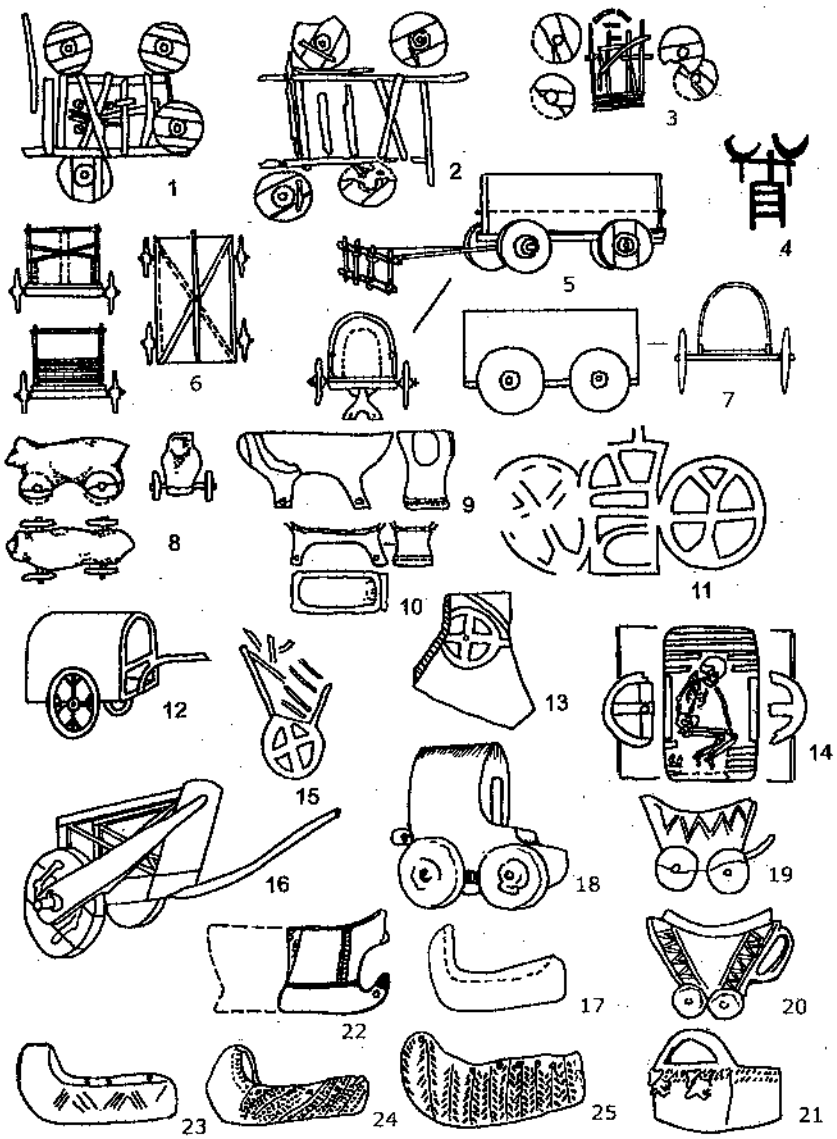


Figure 8. Wooden cars from graves, petroglyphs, and clay models of cars (cultures: 1–2—Novotitarovskaya; 5, 7, 14—Pit-Grave; 3, 6, 16, 17, 23–25—Catacomb)

1—Novotitarovskaya; 2—Ostannyi; 3—Borovkovka; 4, 15—Kamennaya Mogila; 5—Lukyanovka; 6—Kamenka; 7—Pisarevka; 8—Voroshilovka; 9—Vladimirovka; 10—Nemirov; 11, 12—Novonikolaevka (stone slab, covering the grave with representation of two-wheeled vehicle and its reconstruction); 13—Simferopol barrow (stone slab with representation of wheel); 14—Zarechnoe; 16—Mar'evka (reconstruction); 17—Vasil'evka; 18—Kerch (Scythian); 19—Sigetsenmortan (Hungary); 20—Budakalash (Hungary); 21—Radoshin (Slovakia); 22—Tal'yanka (model of a sledge, Tripolye Culture); 23—Rostov; 24—Pokrovskoe; 25—Kondratovka

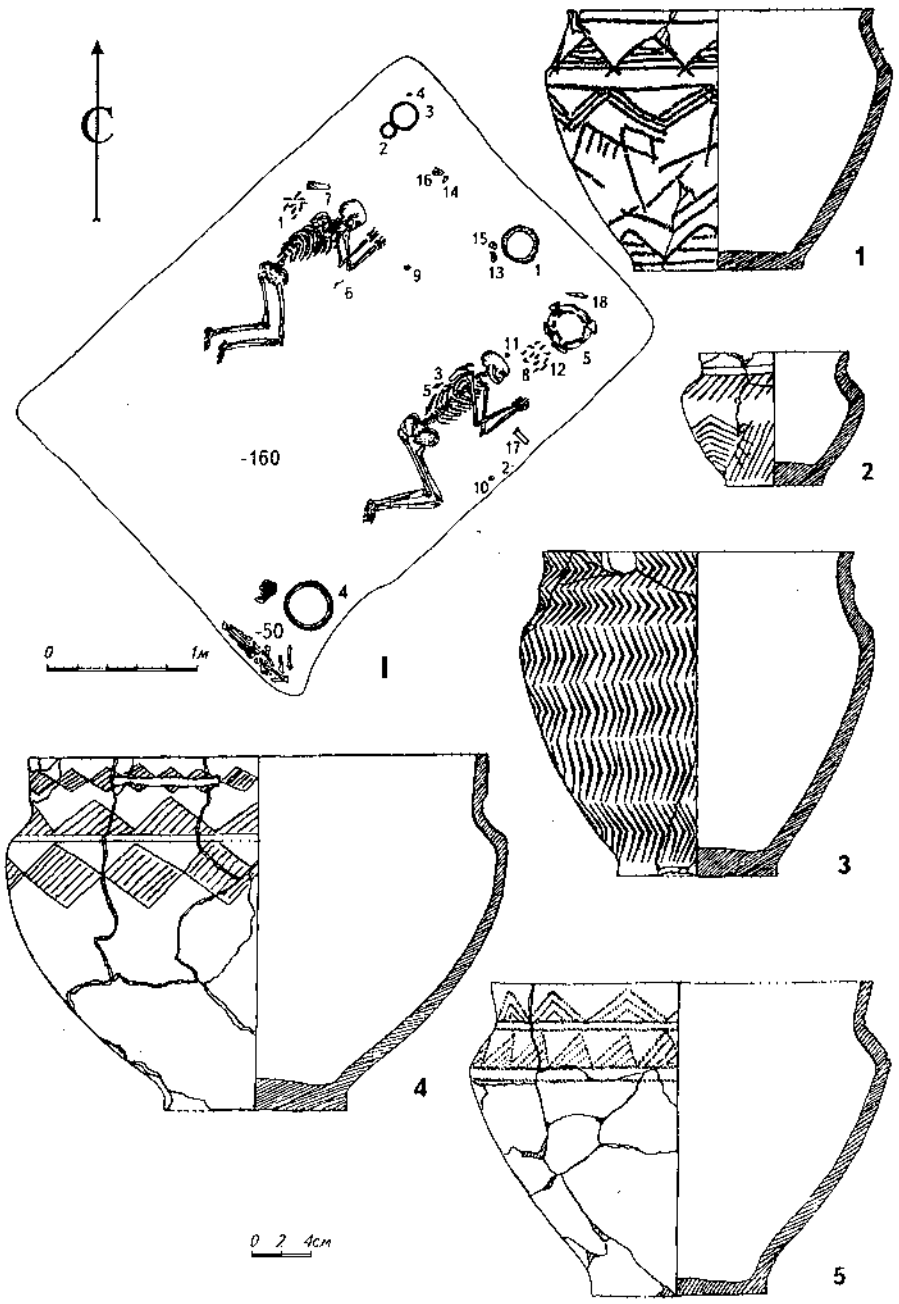


Figure 9. Grave and pottery of the Sintashta type. Cemetery Vostochno-Kuraili, barrow 11, grave 4

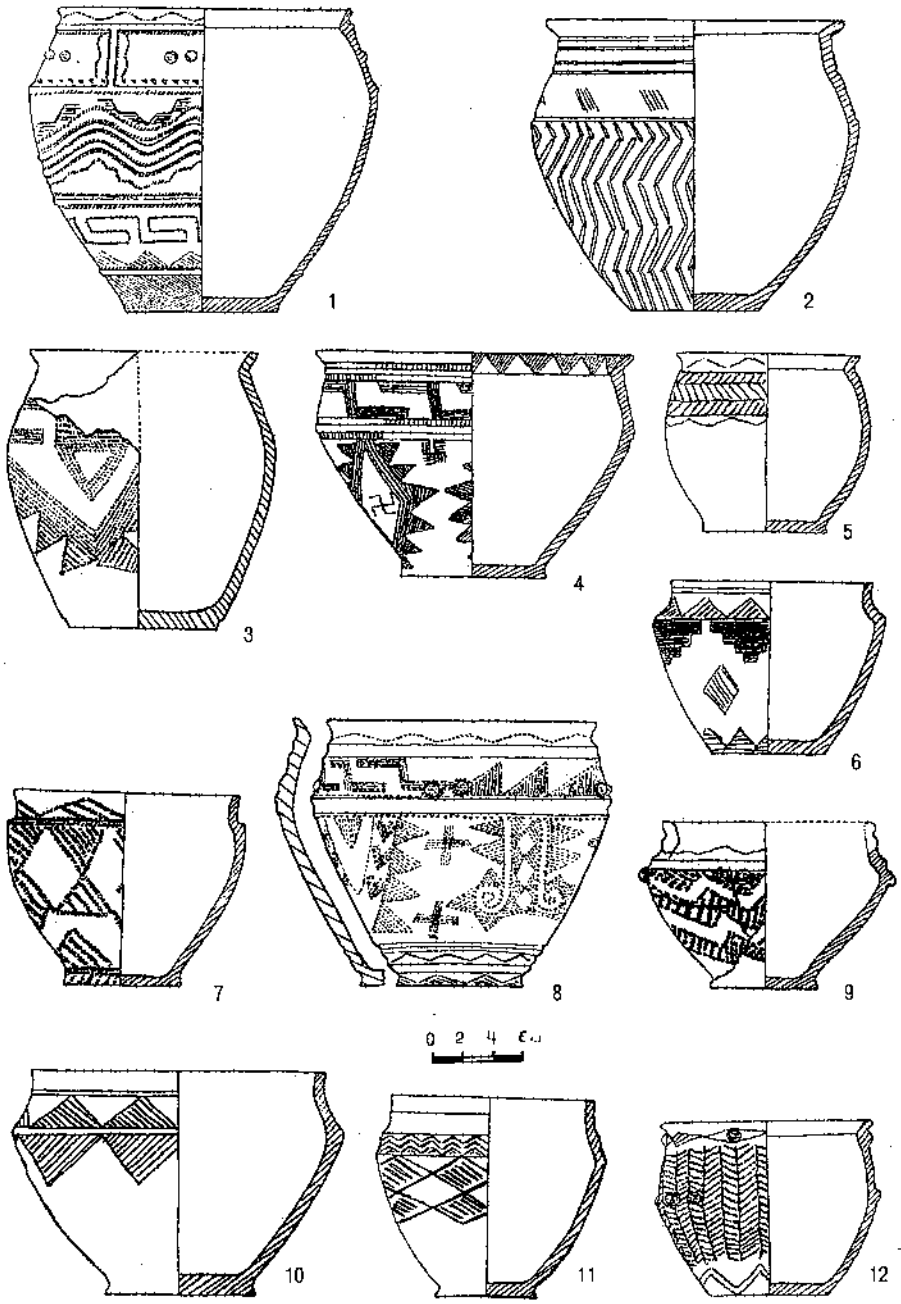


Figure 10. Pottery of the Sintashta type. Cemetery Tanabergen

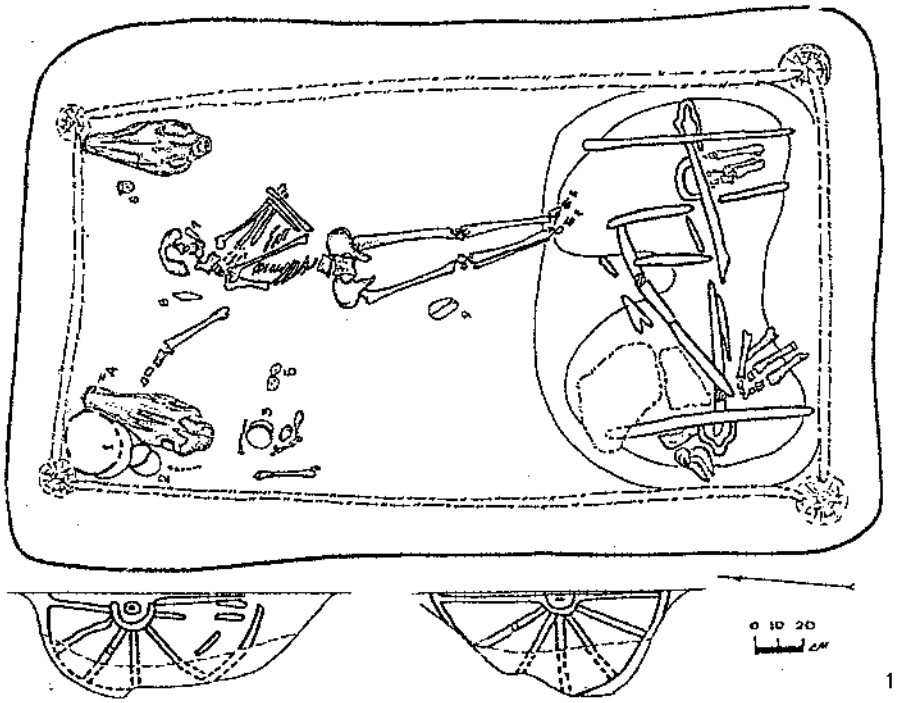


Figure 11. Graves with remains of chariots and imprints of wheels with spokes
1—Krivoe Ozero, barrow 9, grave 1; 2—Berlik II

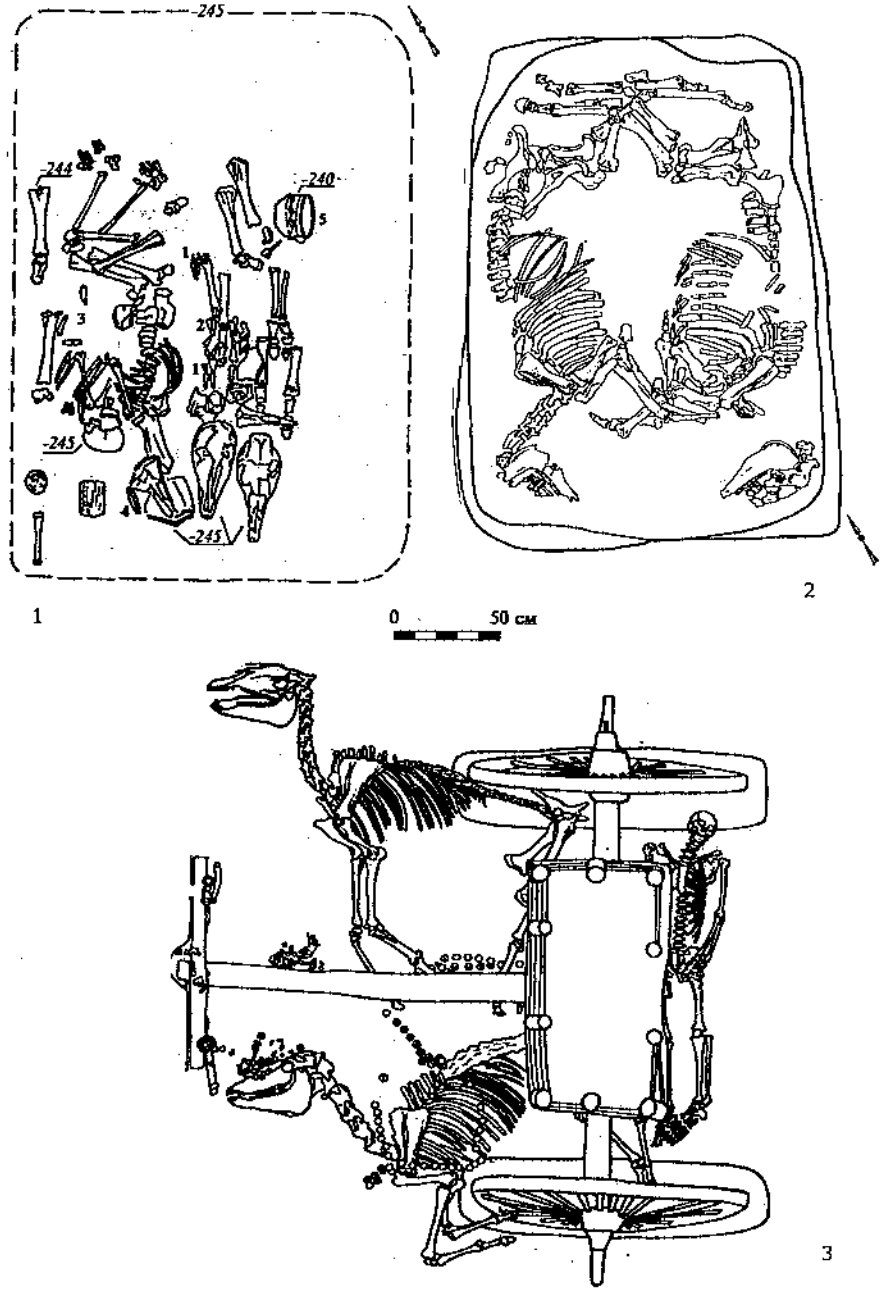


Figure 12. Graves with pairs of chariot horses
1—Kamennyi Ambar cemetery, barrow 2; 2—Uvarovo II, grave 3; 3—Xiaomintun (Anyang)

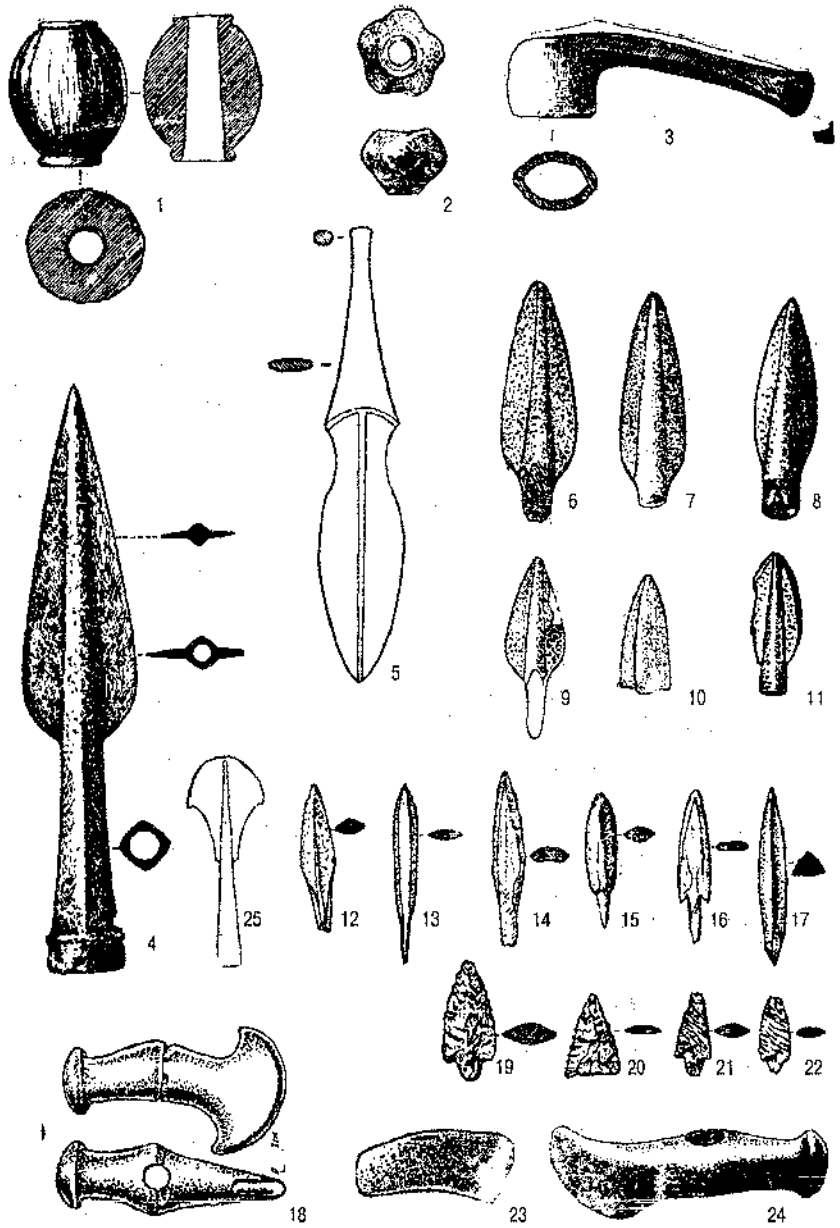


Figure 13. The armament of an Andronovan warrior
1—Alakul; 2—Małokrasnoyarka; 3—Tsarev Kurgan; 4—Bliznetsy (Kumak); 5—Kustanai district; 6, 7—Ortau (Zhaman-Uzen II); 8—Karkaralinsk; 9, 10—Aishrak; 11—Temirtau; 12–17—Alekseevka, bottom level; 18—Korkino; 19–22—Sintashta settlement; 23—Krasnaya Krucha grave; 24—Mirnyi; 25—Sintashta cemetery (2, 18–24—stone; 12–17, 25—bone; the rest—bronze)

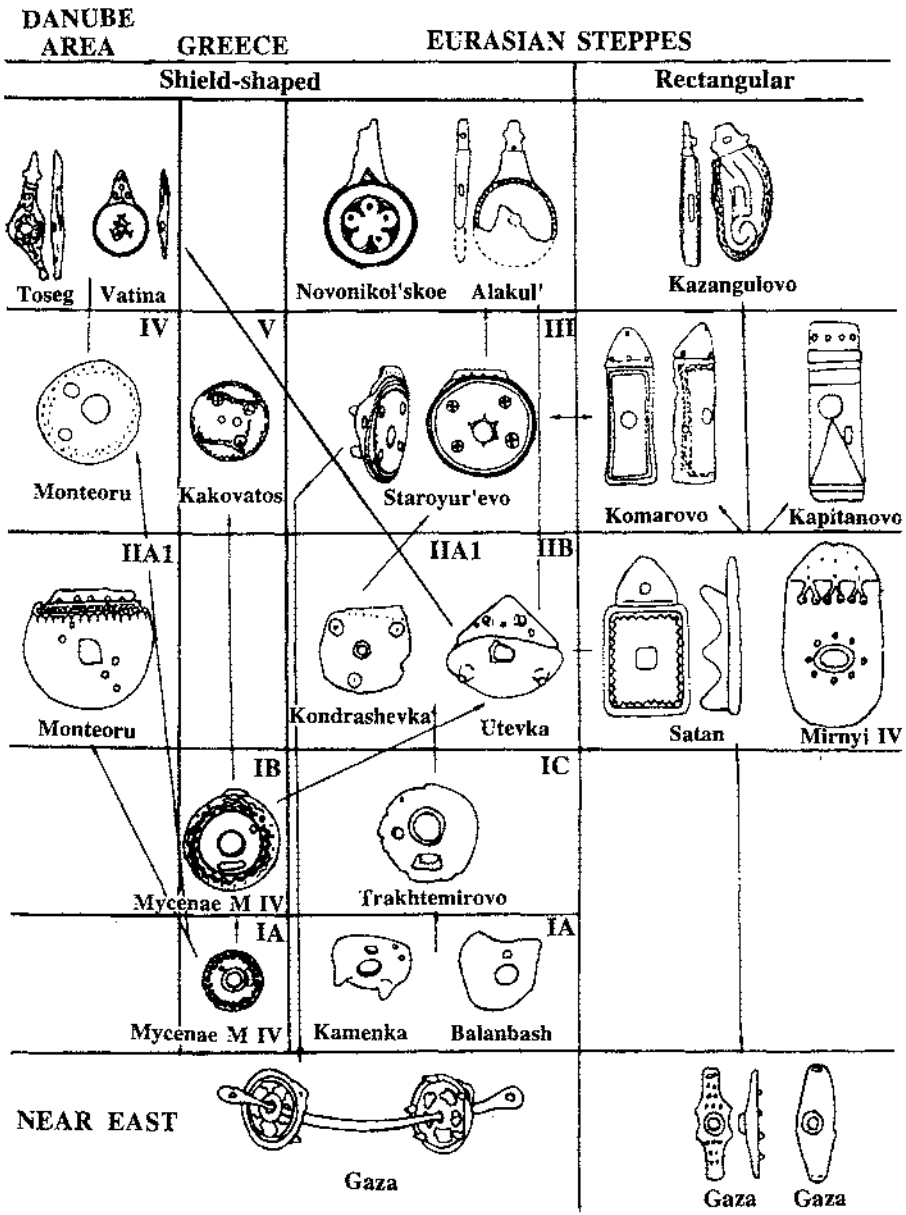


Figure 14. Evolution of types of cheek-pieces of Eurasian Steppes, the Danube area, Mycenae, and the Near East

Figure 15. Bone details of lashes and staffs with Mycenaean ornament
1—Tissafured; 2—Toseg; 3, 4, 8—Vatina; 5, 7—Bluchin; 6—Nitryanski Hradok; 9—Alalach; 10—Petryaevsky; 11—Yubileinoe; 12—Krasnoselki; 13—Novyi Rizadei; 14—Privetnoe; 15—Konstantinovsky; 16—Pasekovo; 17—Shilovskoe; 18, 27—I Fedorovsky; 19—Radchenskoe; 20—Borodaevka; 21—Grafskaya; 22—Kashpirsky; 23, 24—Pokrovsky; 25—Vil'no-Grushevka; 26, 32—Novopavlovsky; 28—Staraya Kalitva; 29—Istomin; 30—Mirnyi; 31—Pavlovsky Plodosovkhoz; 33—Bykovo; 34—Berezovsky (After Besedin 1999, fig. 2)

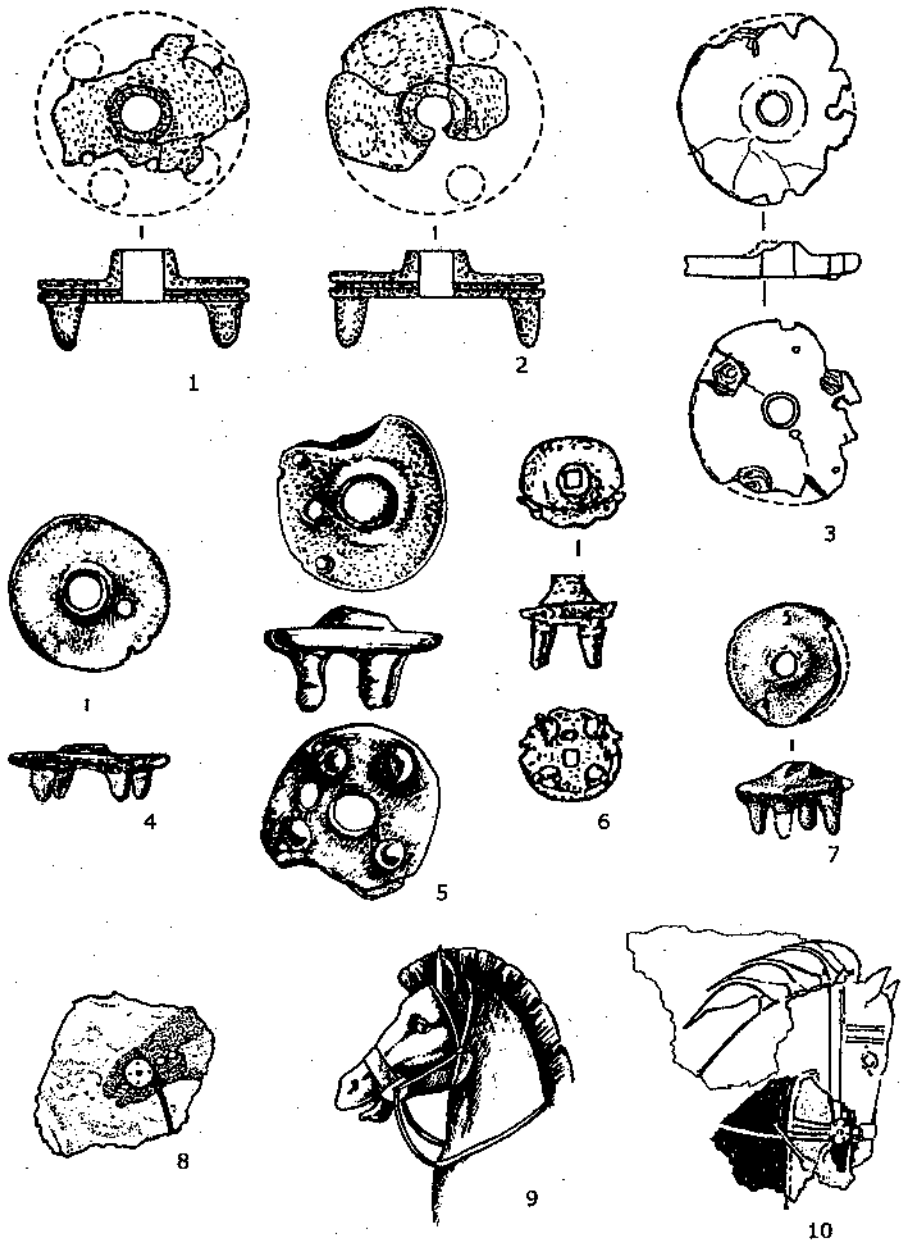


Figure 16. Cheek-pieces from the Urals and Volga, with analogs from Uzbekistan. The representation of horses and the reconstruction of the bridle
1–2—Zardcha-Khalifa; 3—Dzharkutan; 4, 5—Potapovka; 6—Kamennyi Ambar; 7—Sintashta; 8, 10—representation of the bridle on the frescos from Tiryns; 9—reconstruction of Potapovka bridle

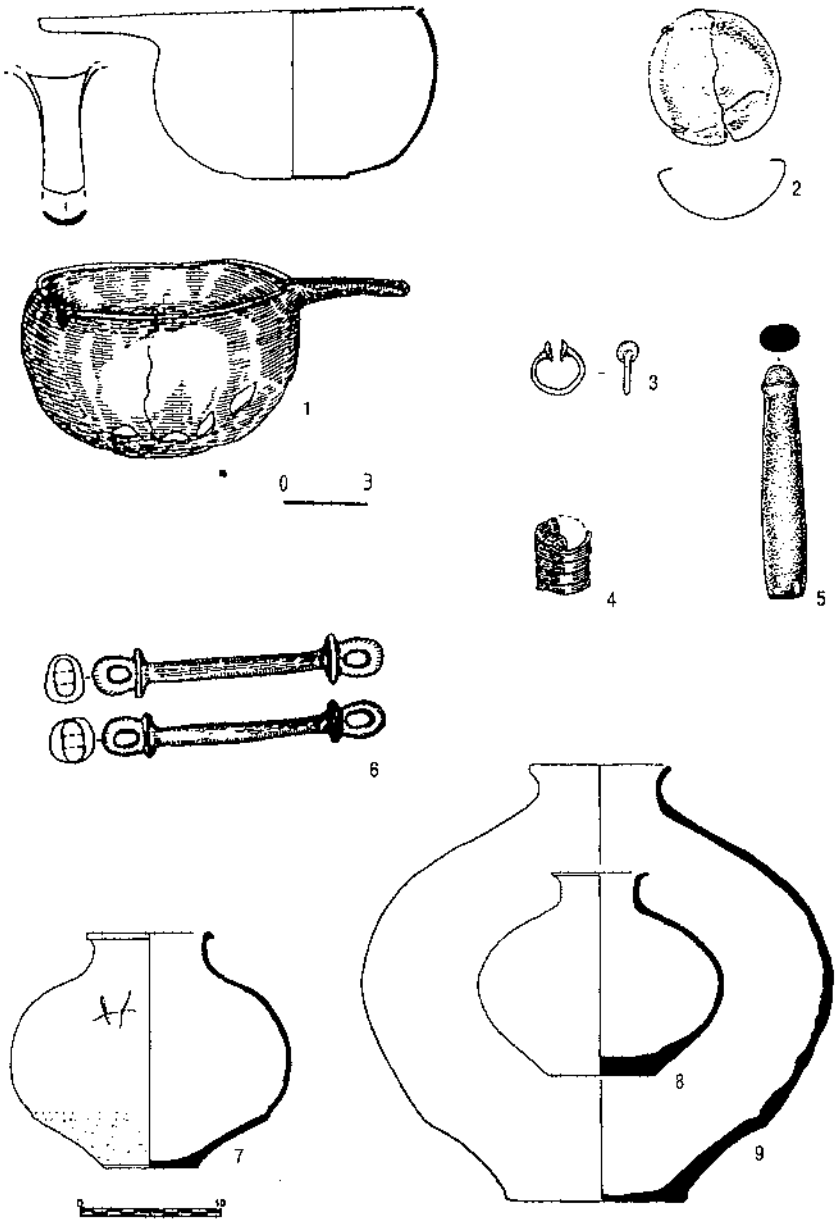


Figure 17. Complex of Zardcha-Khalifa
1, 2, 4–vessels; 3–temple-ring; 5–pestle; 6–bits; 7–9–pots (1, 4, 6–metal; 2, 3–gold; 5–stone; 7–9–pottery)

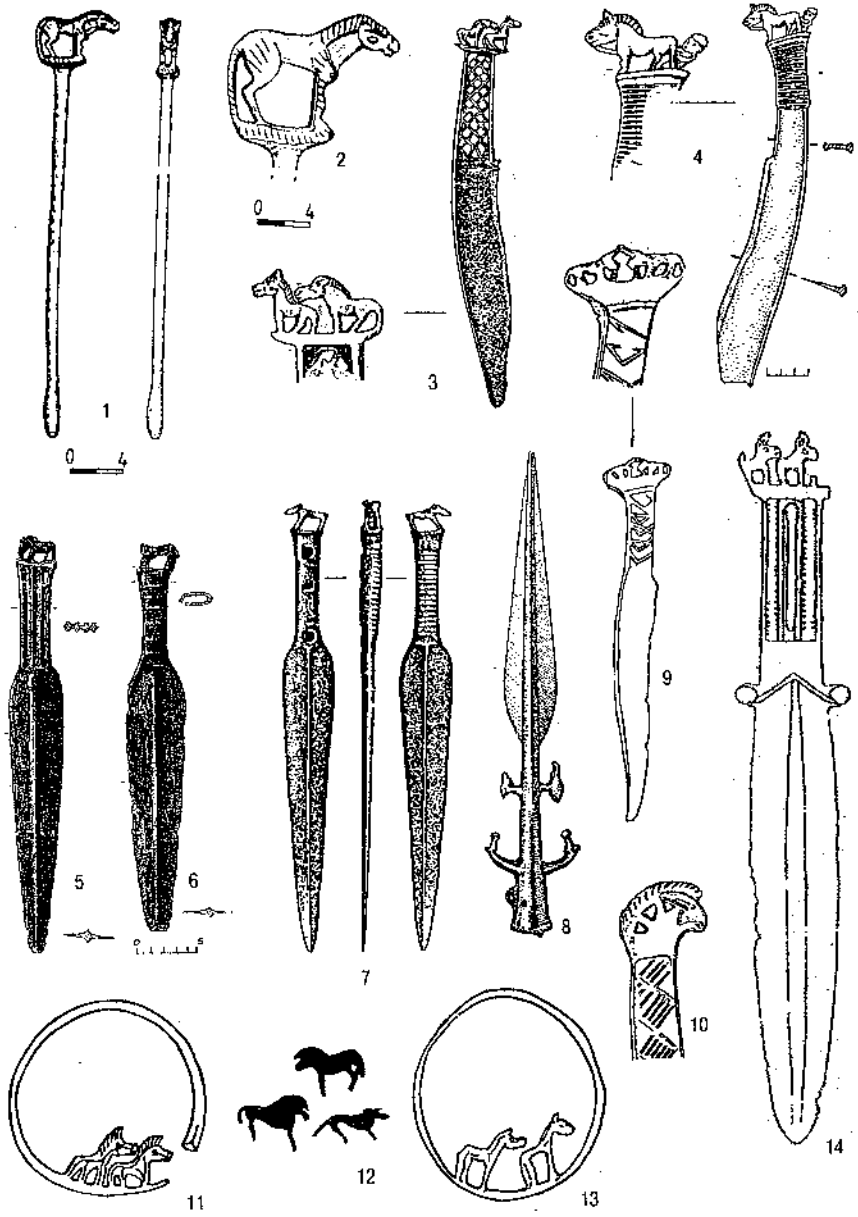


Figure 18. Representations of equids in Zardcha-Khalifa and the Eurasian Steppes
1–2–Zardcha-Khalifa; 3–Seima; 4–Rostovka; 5–6–Karakol II; 7–Kurchum; 8–Dzhetygora; 9–Dzhumba; 10–Elunino; 11–Munshunkur; 12–petroglyphs from Central Kazakhstan; 13–Chesnokovo I; 14–Tuva

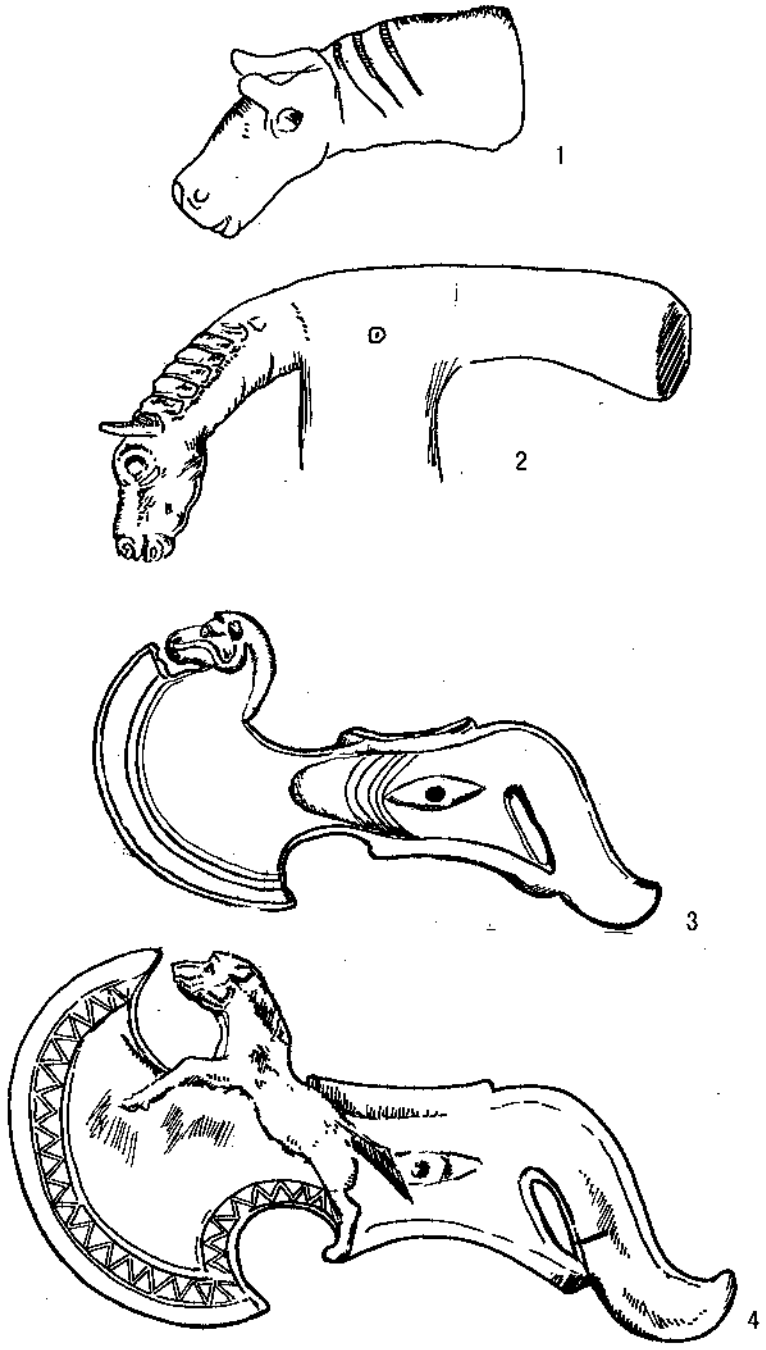


Figure 19. Bronze staff and axes with the representations of horses from South Bactria

1–4—chance finds (4—Mahboubian collection)

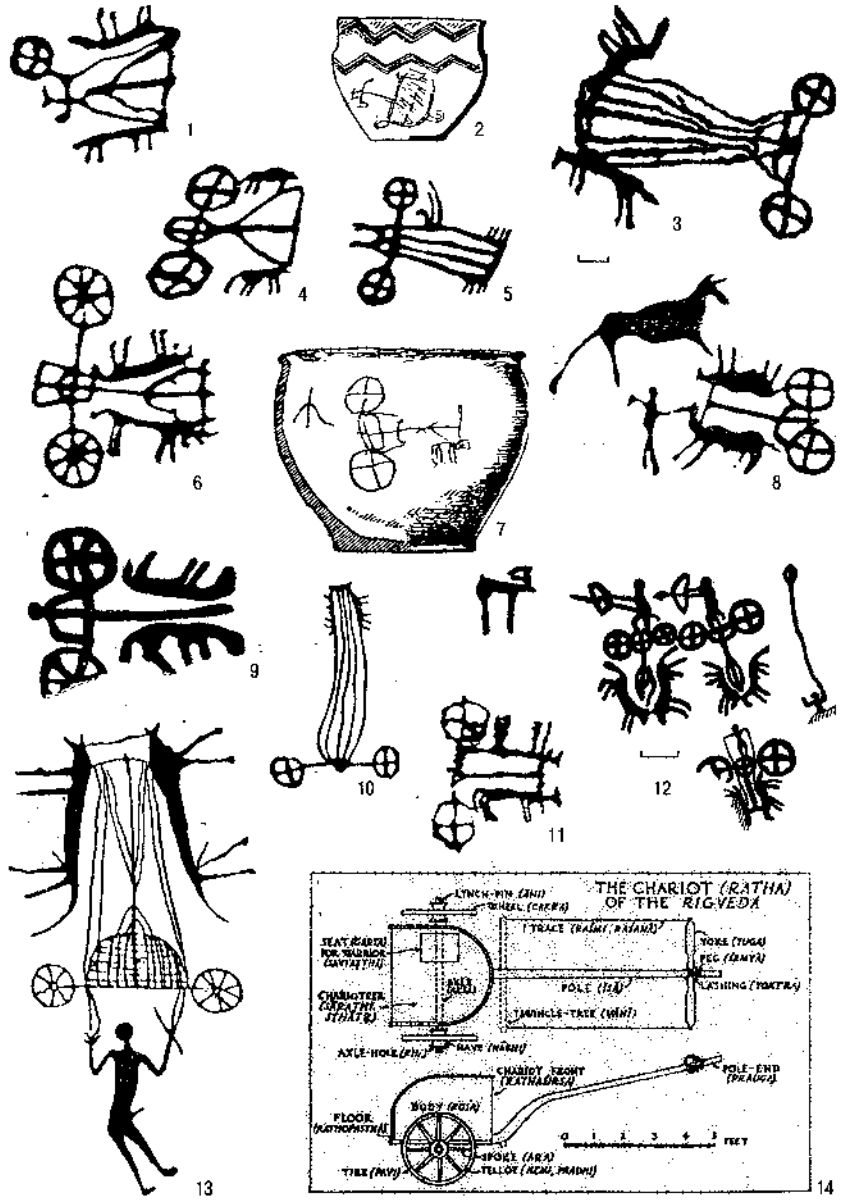


Figure 20. Representations of chariots on Andronovo and Timber-Grave pots and petroglyphs from Central Kazakhstan, the Pamirs and Tuva; reconstruction of *Rigveda* chariot

Petroglyphs: 1, 3—Koibagar III; 4—Kok-Bulak; 5, 10—Koibagar I; 6—Syyn-Churek (Tuva); 8—Gabaevka; 9—Tekke-Tash (the Pamirs); 11—Chinge (Tuva); 12—Arpauzen V; 13—Akdzhilga (the Pamirs);

Cemeteries: 2—Spasskoe I (the Urals); 7—Sukhaya Saratovka (the Volga); 14—chariot of the *Rigveda* (after W. Rau 1983, fig. 5)

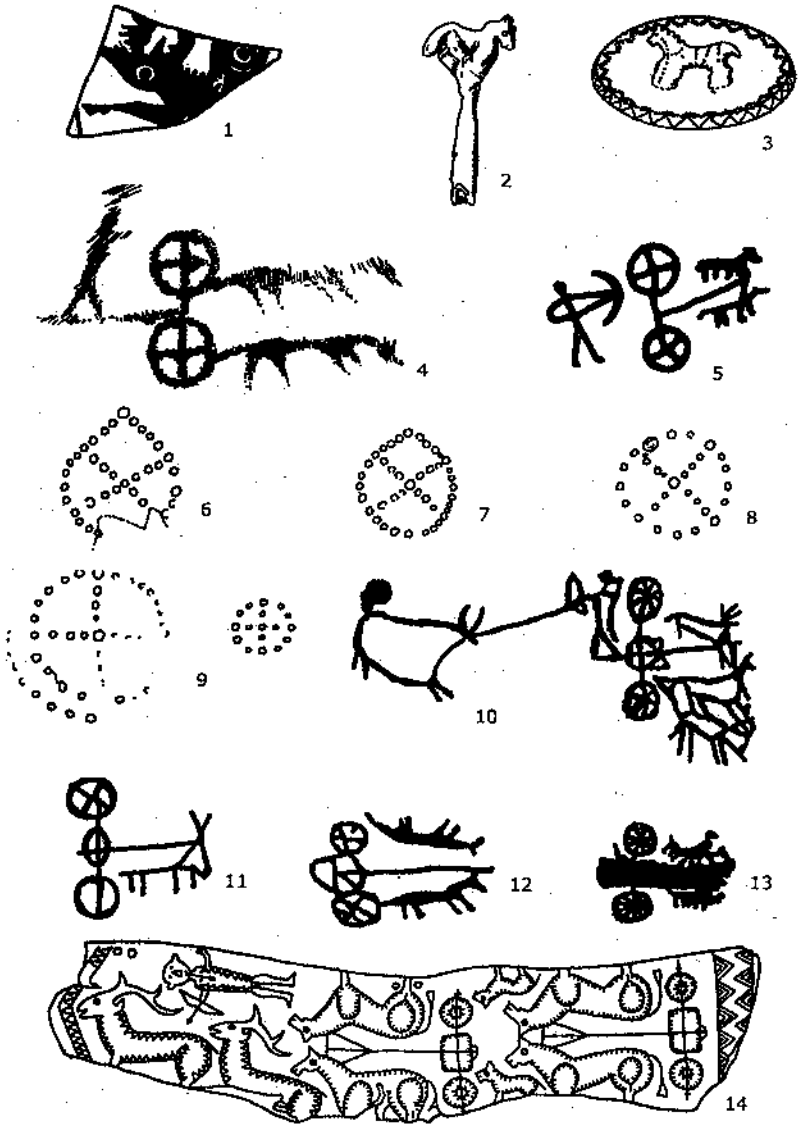


Figure 21. Representations of horses and chariots in Swat, Xinjiang, and Mongolia

Pottery: 1–Bir-Kotghwandai (period Ghalegai IV); 3–clay cover (Loebanr necropolis);

Bronze: 2–bronze rod (Katelai necropolis);

Petroglyphs: 4–Lccha-gata (from photograph); 5–Thor (north bank of the Indus); 6–9–Durbandai, site 23; 10–Lunshan (Qinghai province); 11–Lijiawanzi (Balikun district); 12–Badakhshan; 13–Congcheng (Hami);

Bone plaque: 14–Nanshangen, tomb 102

(1–9–Swat, 10–13–Xinjiang [12–the Pamirs]; 14–Inner Mongolia)

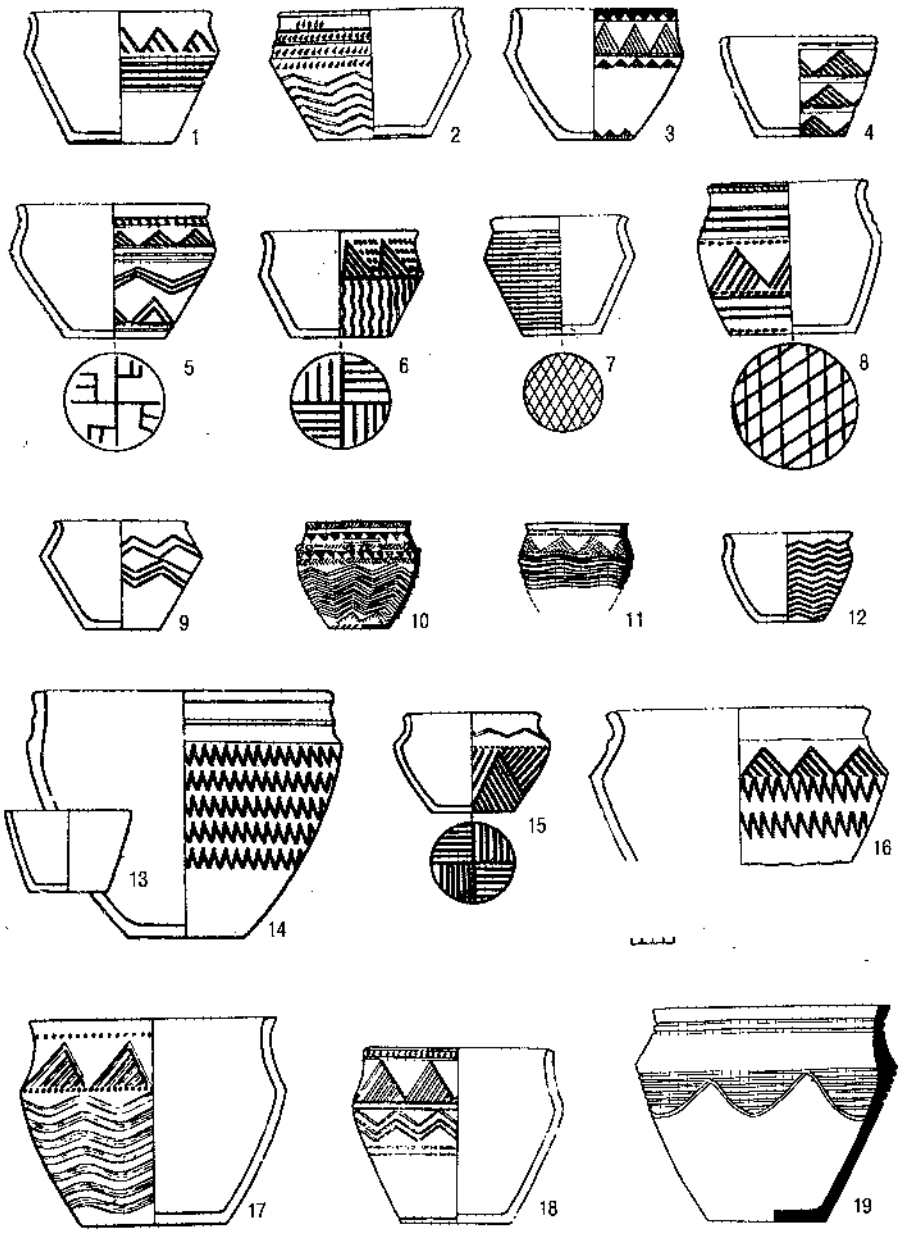


Figure 22. Petrovka-type pottery

Petrovka Cemetery, North Kazakhstan

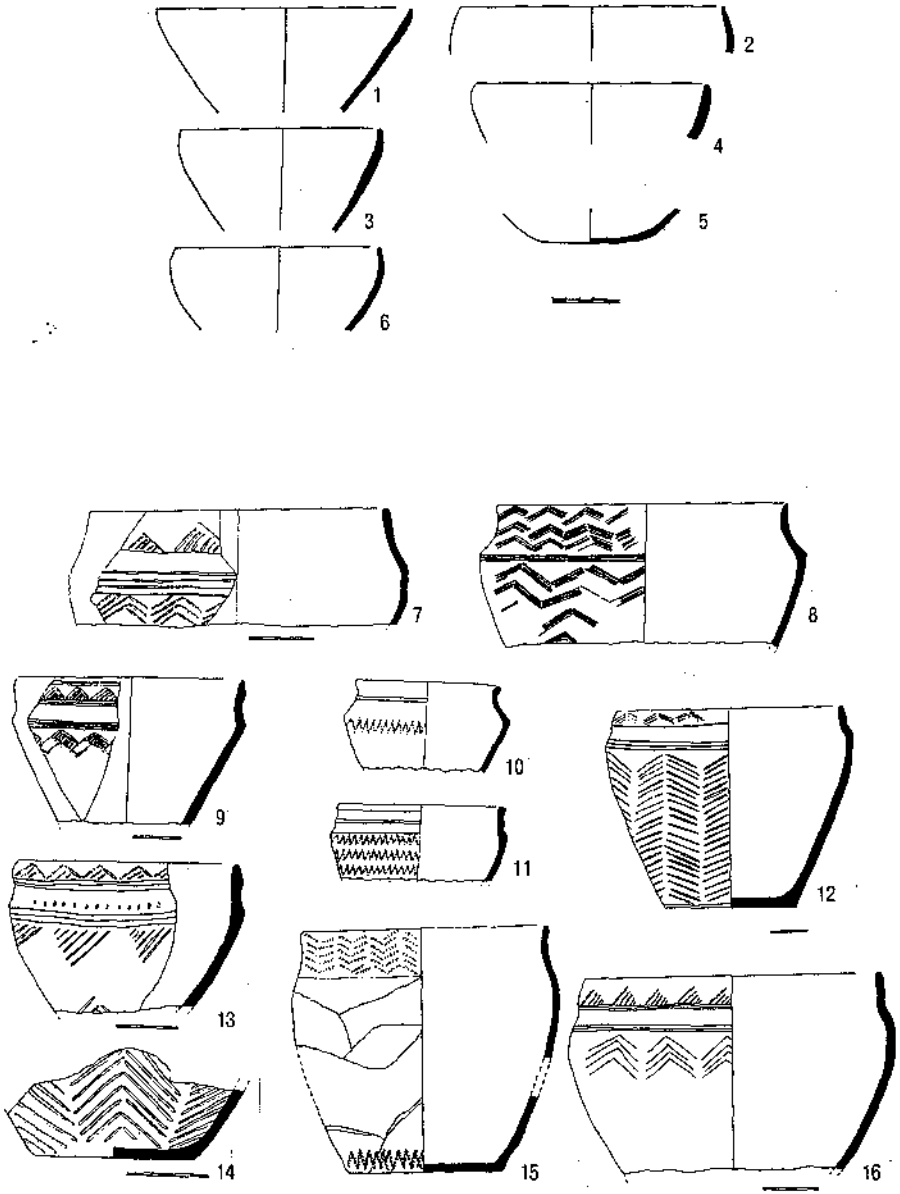


Figure 23. Pottery from Tugai settlement, Uzbekistan
1–6—Sarazm agricultural settlement type; 7–16—hand-formed Petrovka type

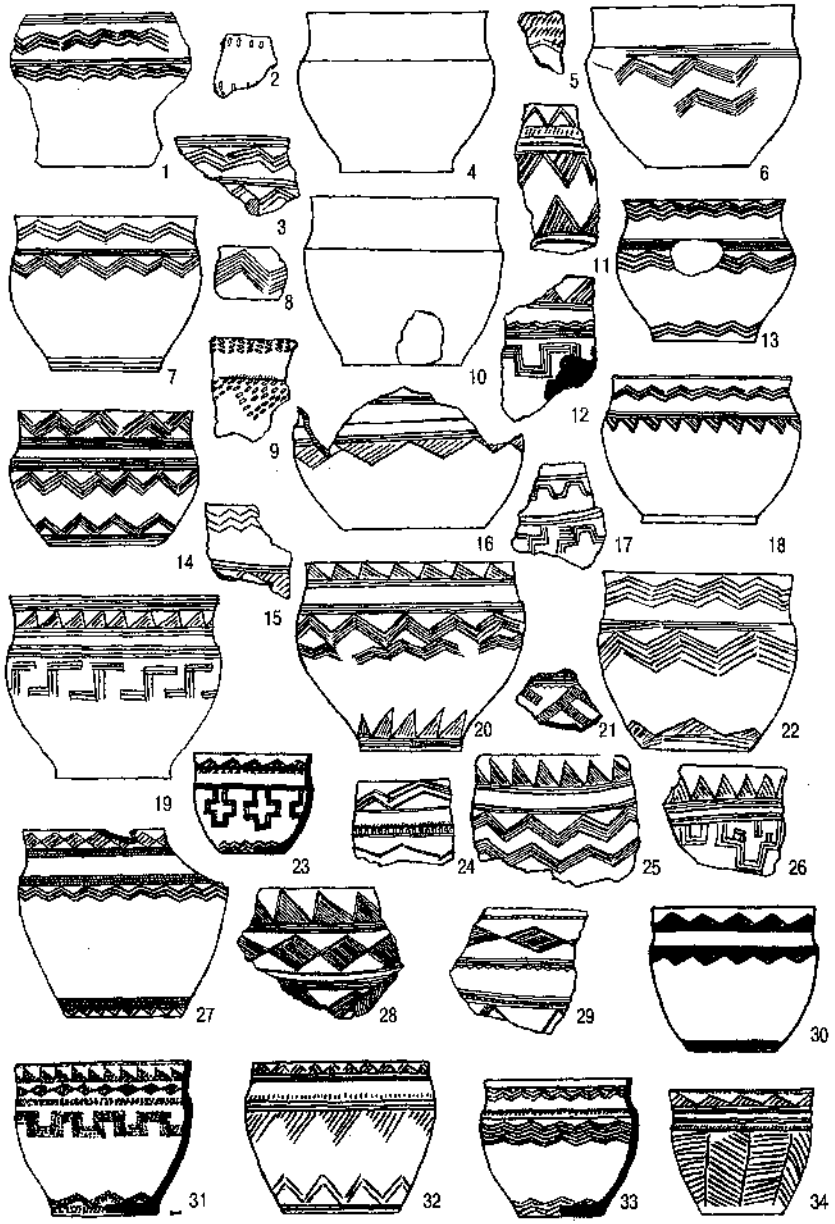


Figure 24. Andronovo pottery of Alakul type (the Urals, Alakul cemetery)

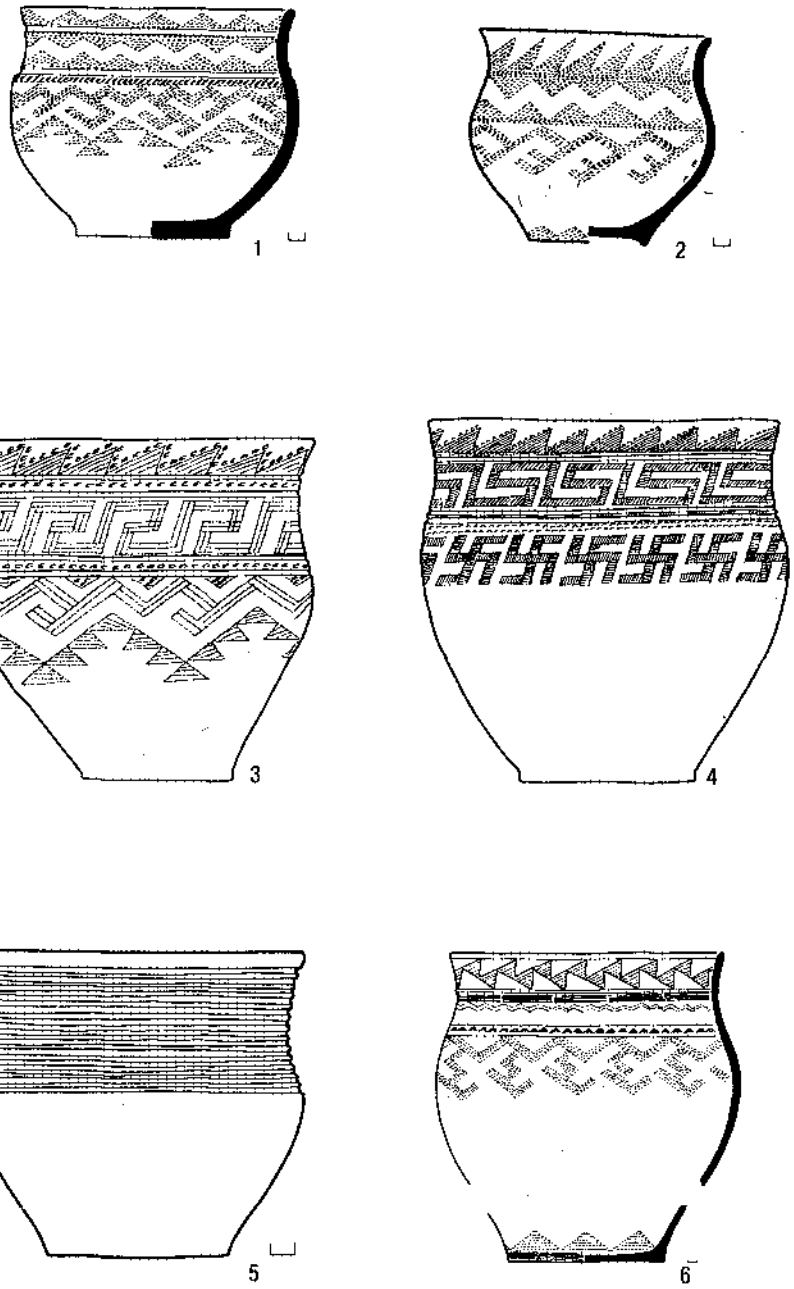


Figure 25a, b. Andronovo pottery of Fedorovo type (North Kazakhstan, cemeteries)
a: 3, 4—Biyrek-Kol'; others Borovoe

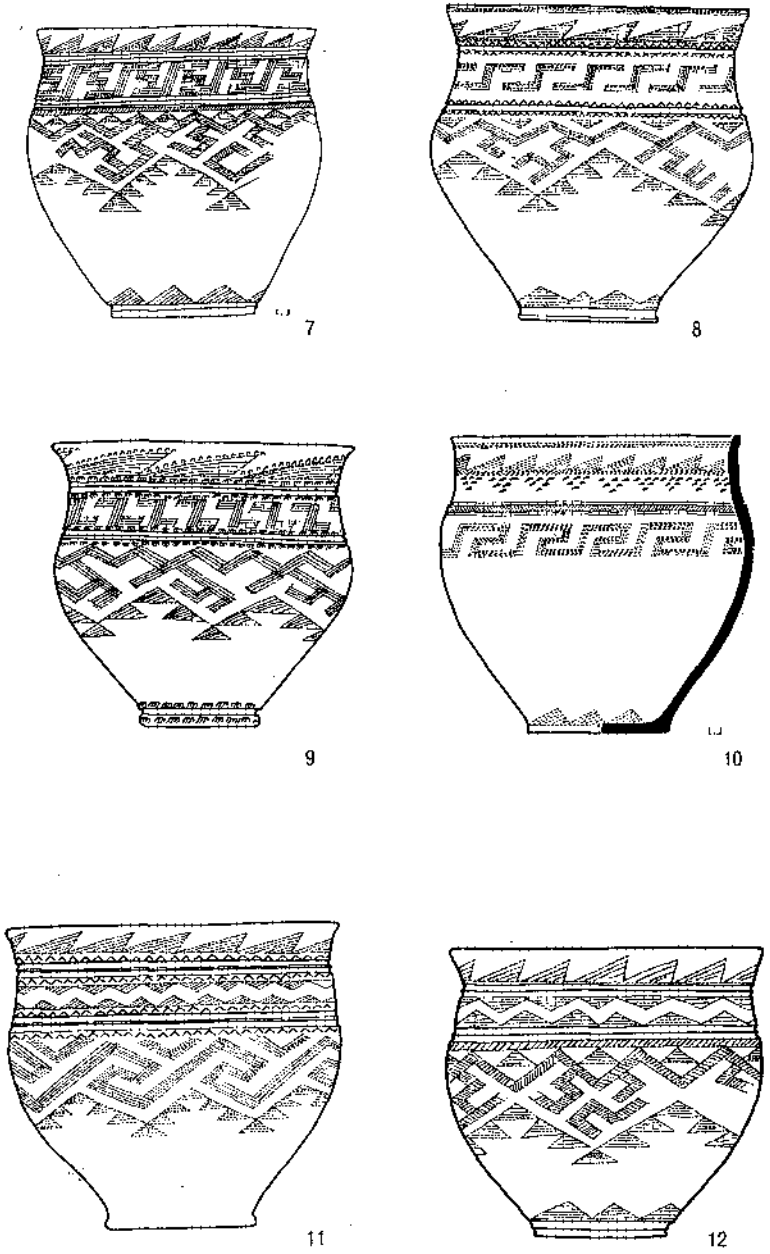


Figure 25 Continued

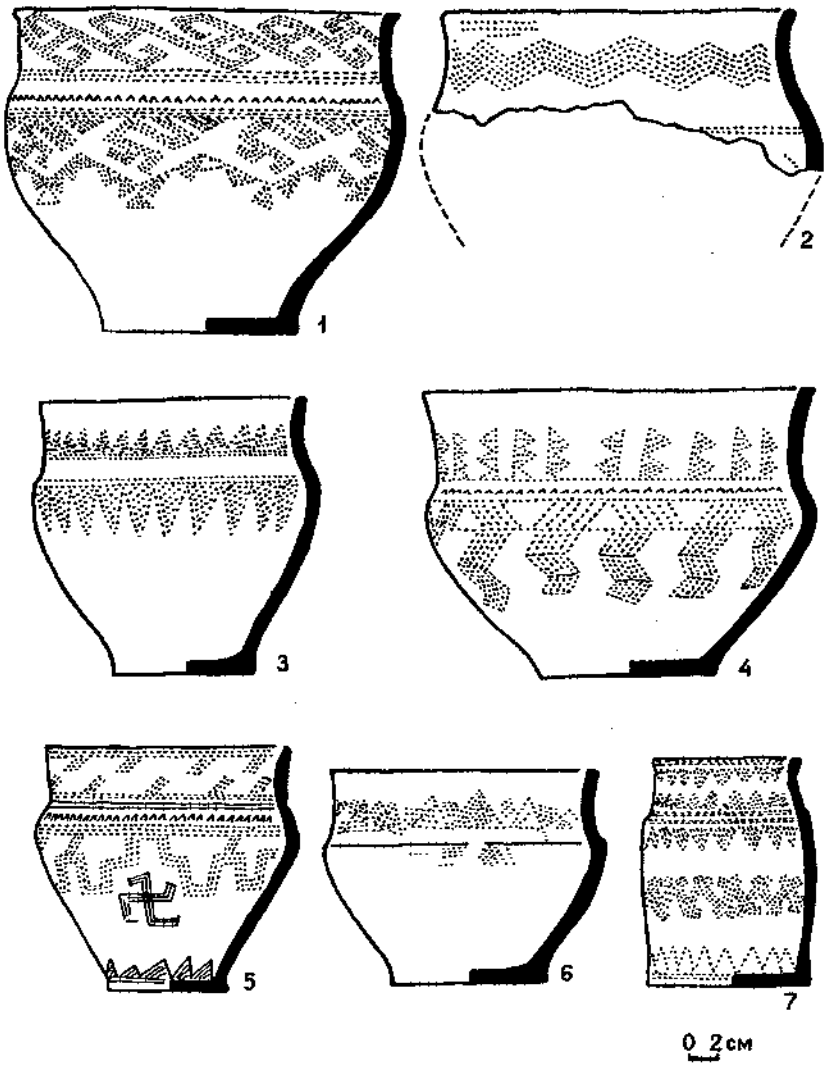


Figure 26. Andronovo pottery of Tautary type (South Kazakhstan, Tautary cemetery)

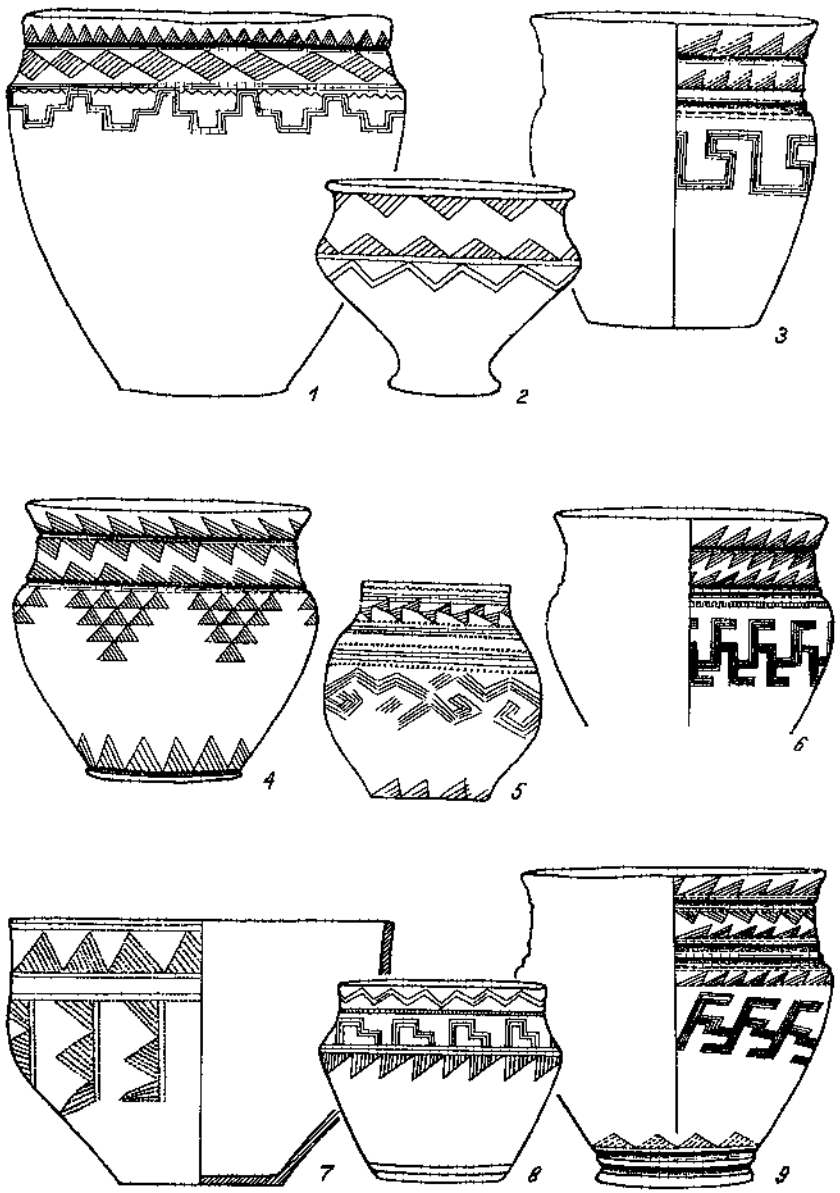


Figure 27. Andronovo pottery of Atasu type (Central Kazakhstan and Tashkent oasis)
1—Efimovka; 2—El'shibek; 3, 6, 9—Atasu; 4, 8—Karaganda area; Tashkent oasis: 5—Zangi-Ata; 7—Chimkent-Tashkent road

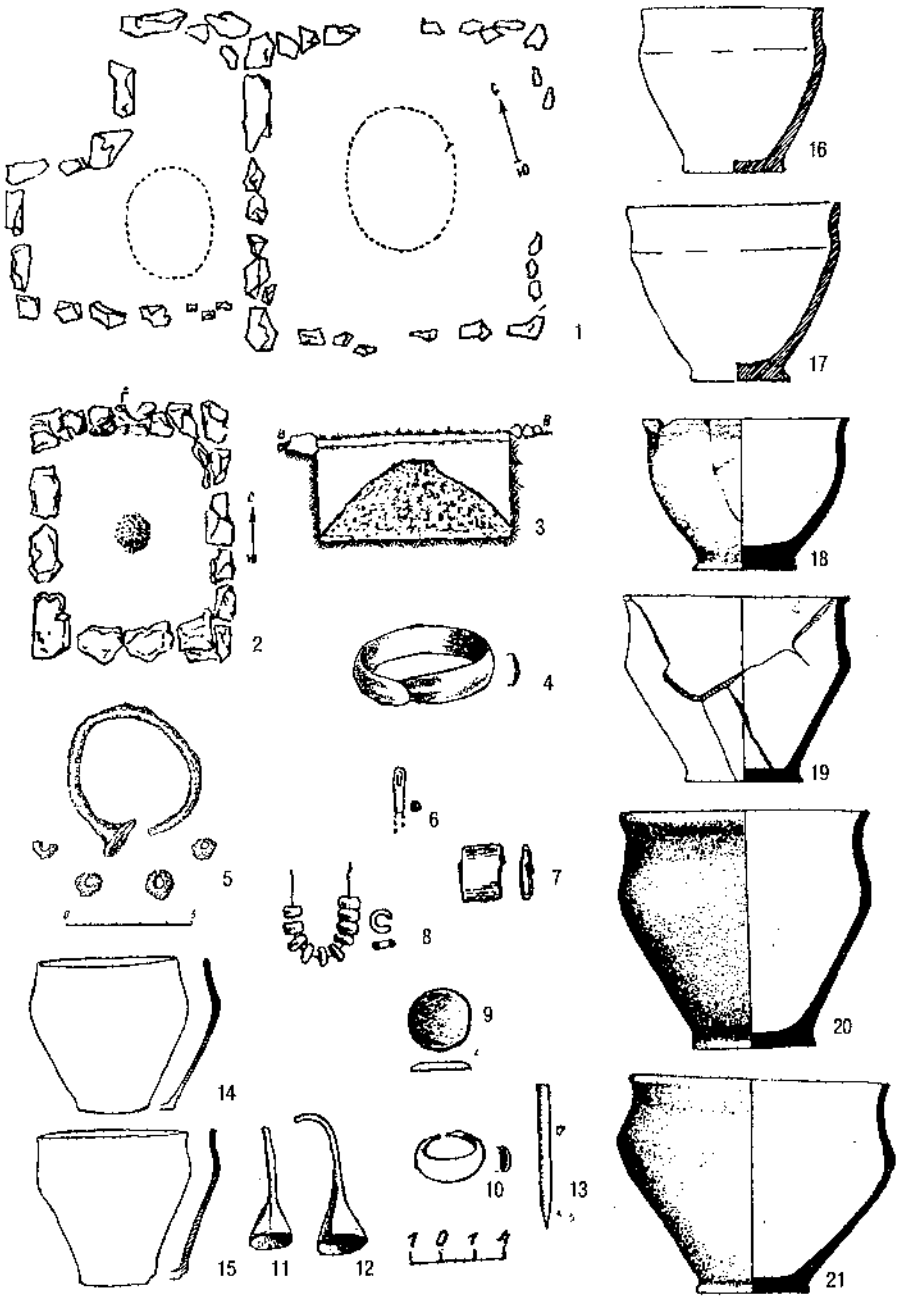


Figure 28. Andronovo complex of Semirechye type
1–4, 6–15—Tash-Tyube II; 5, 16, 17—Tegirmen-sai; 18–21—Uzunbulak

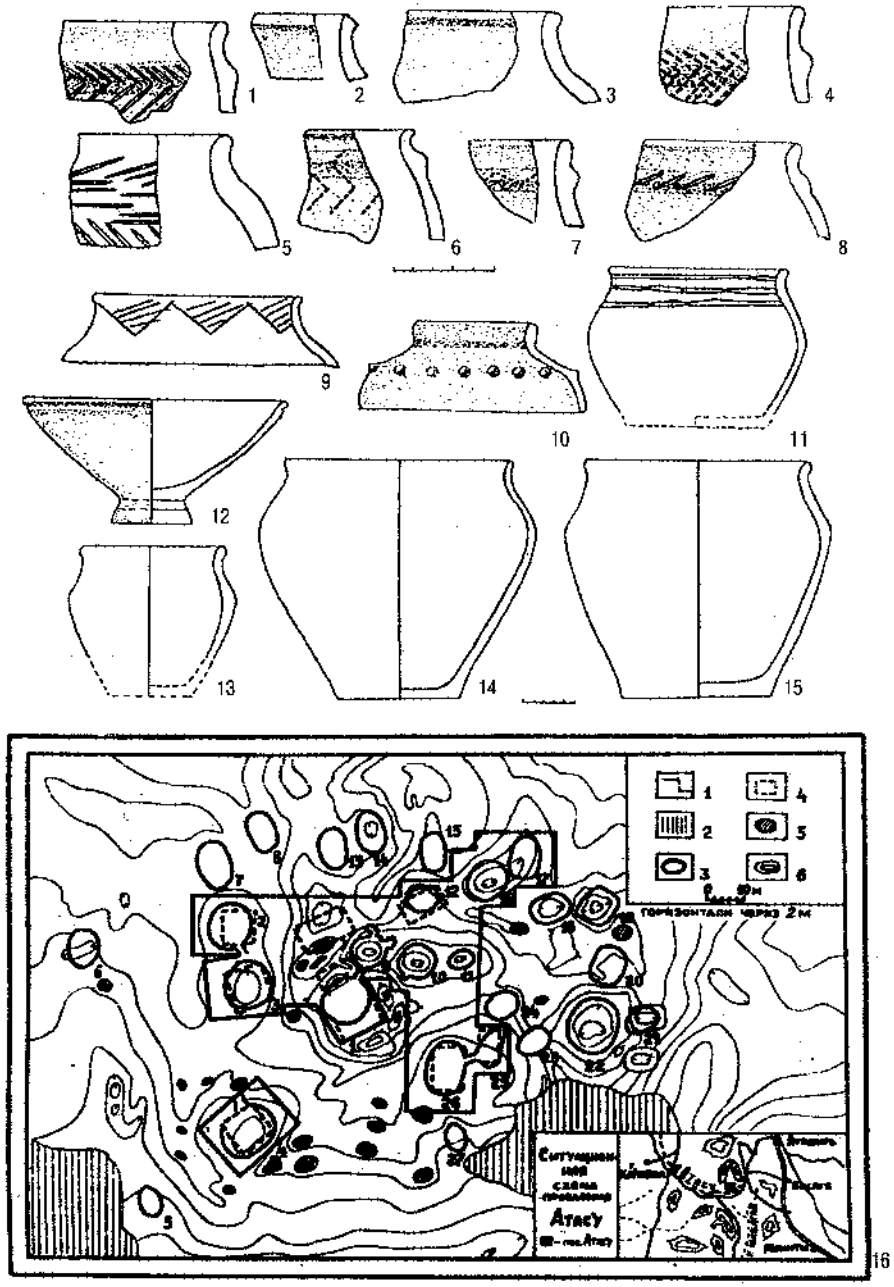


Figure 29. Late Andronovo–Alekseevka type complexes in Central Kazakhstan
1–15—pottery of Ikpen' settlement (top horizon); 16—Topographical plan of Atasu settlement. Key: 1. outlines of excavated zones; 2. original pits; 3. outlines of later houses; 4. outlines of older houses; 5. ash heaps; 6. elevation contours (2 meters). Inset: Map of Atasu settlement and environs (rivers: Karazhal, Atasu, Agadyr', Bosaga, Mounty)

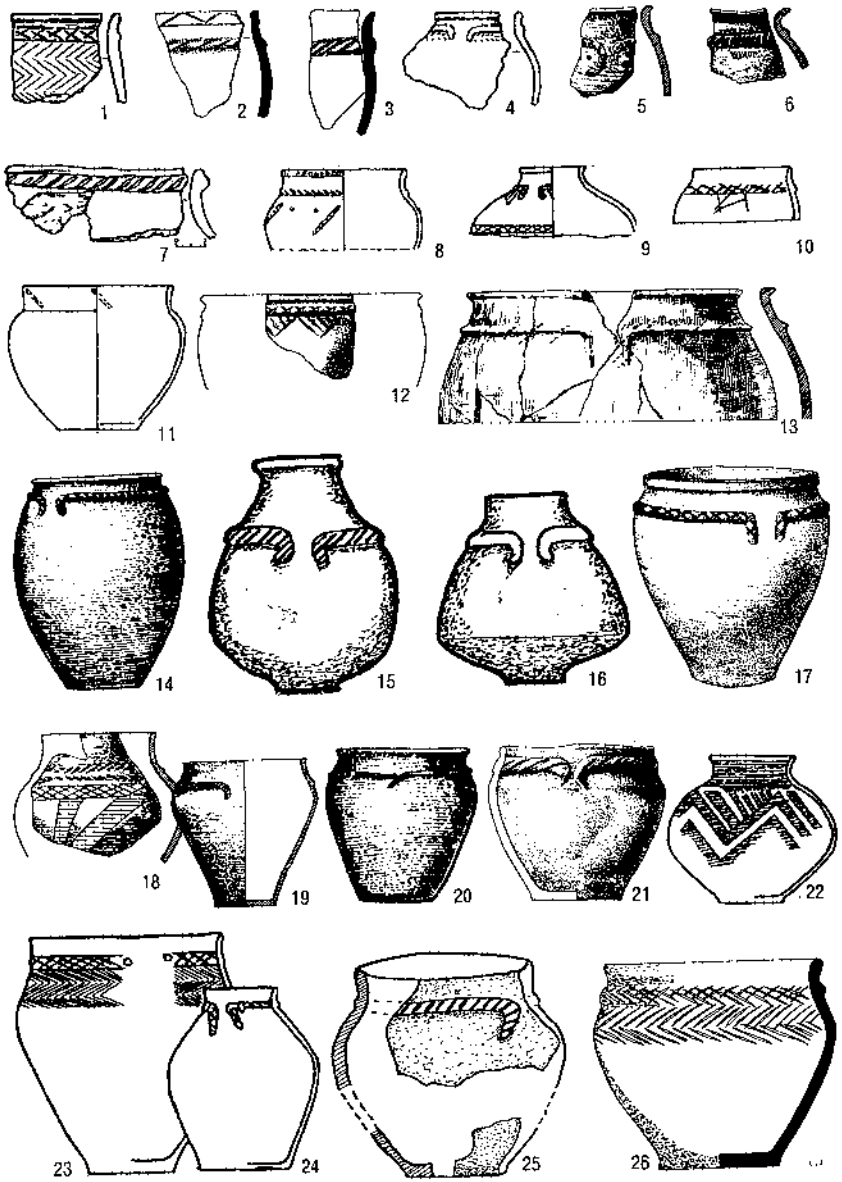


Figure 30. Alekseevka-type pottery with applied roller decoration from Asian Steppes and its analogies from South Russia and Iran

Settlements: 1, 4–Kent; 2, 3–Kirovskoe; 5, 6–Belozerka; 7, 8–Dongal; 9–11, 19, 22–Novonikolskoe; 13–Trushnikovo; 14–Chervonnoe Ozero; 17–Ivanovka; 18–Sargary; 20–Ushkalka; 23–24–Petrovka II;

cemeteries: 12–Begazy; 15, 16–Giyan (Iran); 21–Bykovo; 25–Bola-Kulboldy; 26–Alekseevka

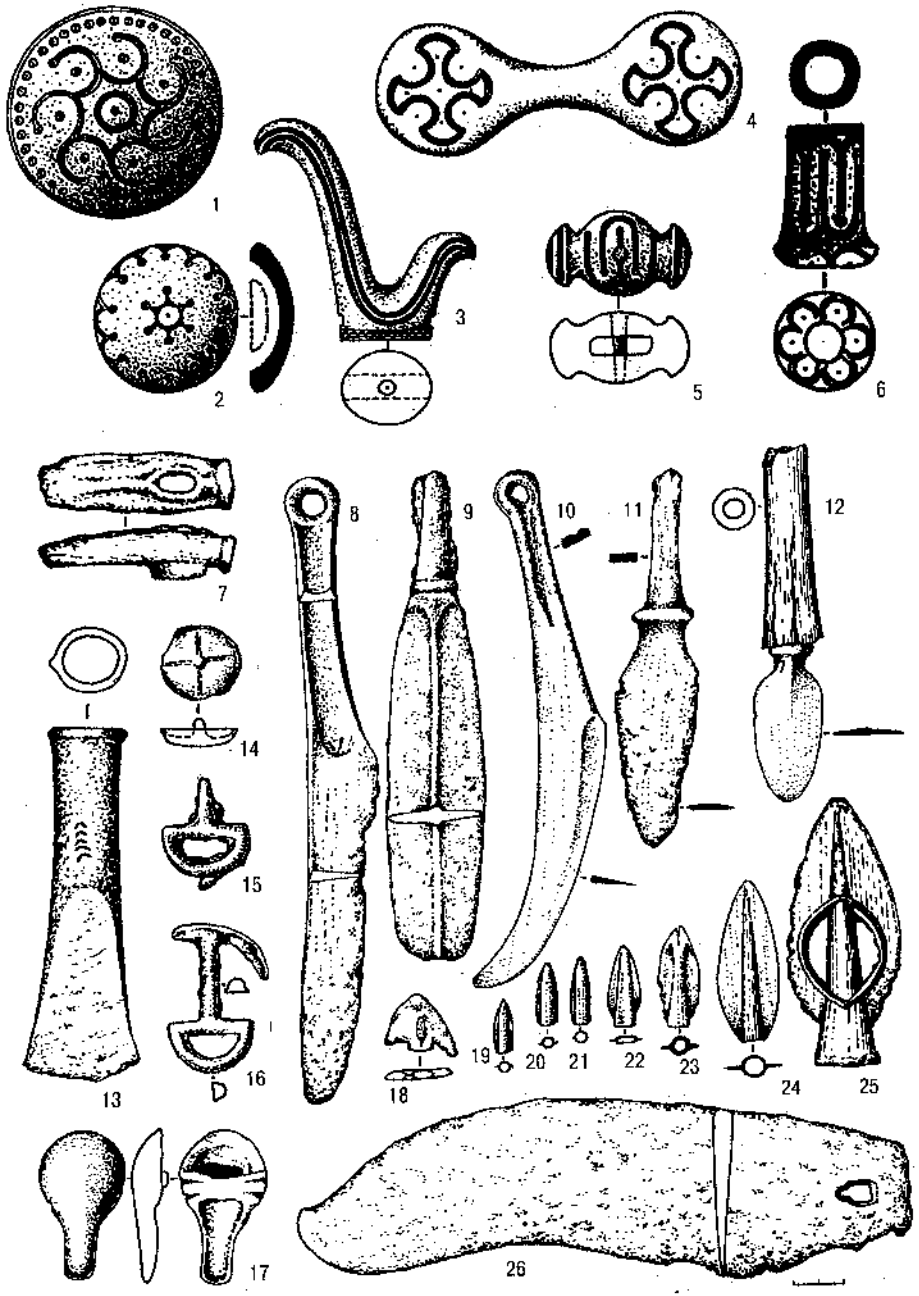


Figure 31. Artifacts of Final Bronze Age, Central Kazakhstan (Kent settlement, after Varfolomeev 2003, figs. 3–5)

1–6–bone, others bronze

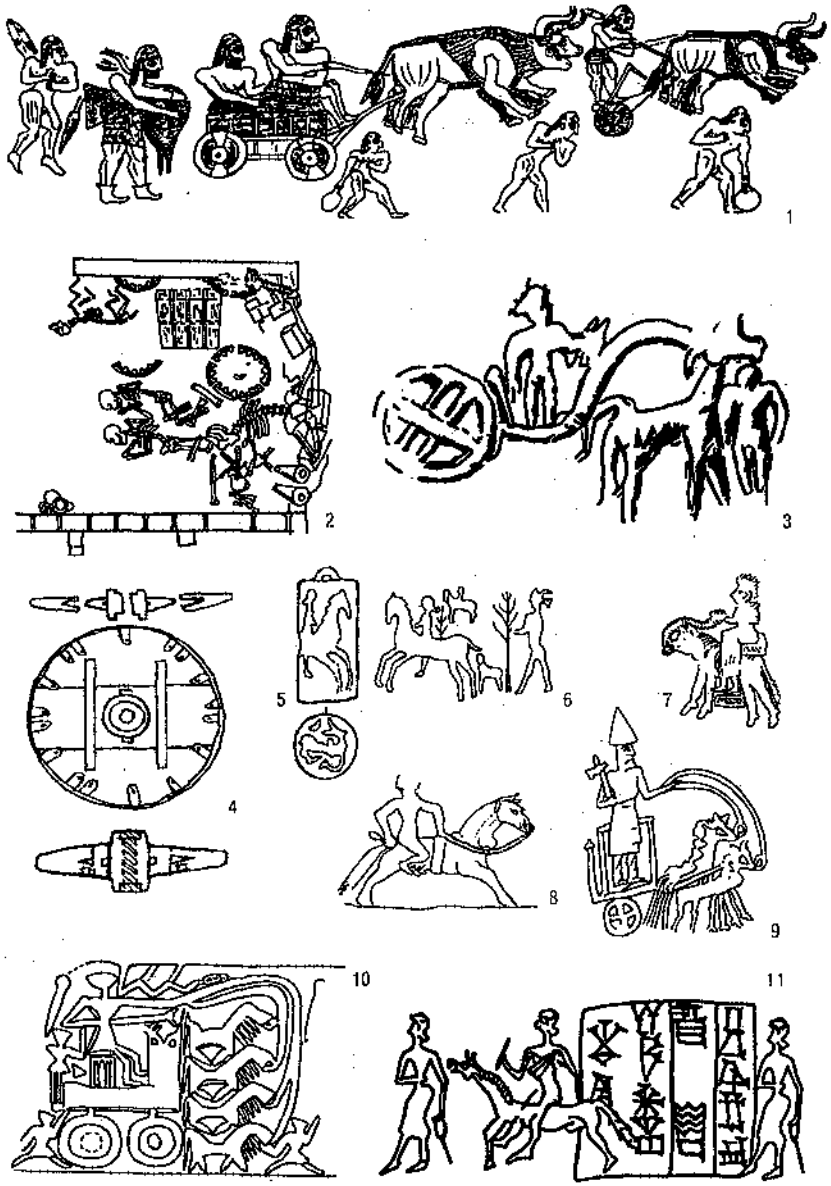


Figure 32. Transport of North-East Iran, Bactria, Margiana, and the Near East
1–silver bowl from South Bactria (Paris, Louvre); 2–the rich grave 3200 with four-wheeled car, Bactrian camel and horse, Gonur cemetery; 4–reconstruction of wheel from this grave (after Dubova 2004, figs. 21, 41); 6–11–seals; 3–representation of car with cross-bar wheel, Tepe-Hissar; 5, 6–cylinders from Bactria; 7–Kül-Tepe, Karum II; 8–plaque with representation of horsemen; 9–biga with equids, New York, Metropolitan Museum of Art; 10–quadrille with equids, Tell-Brak; 11–imprint with the name of King Šu-sin

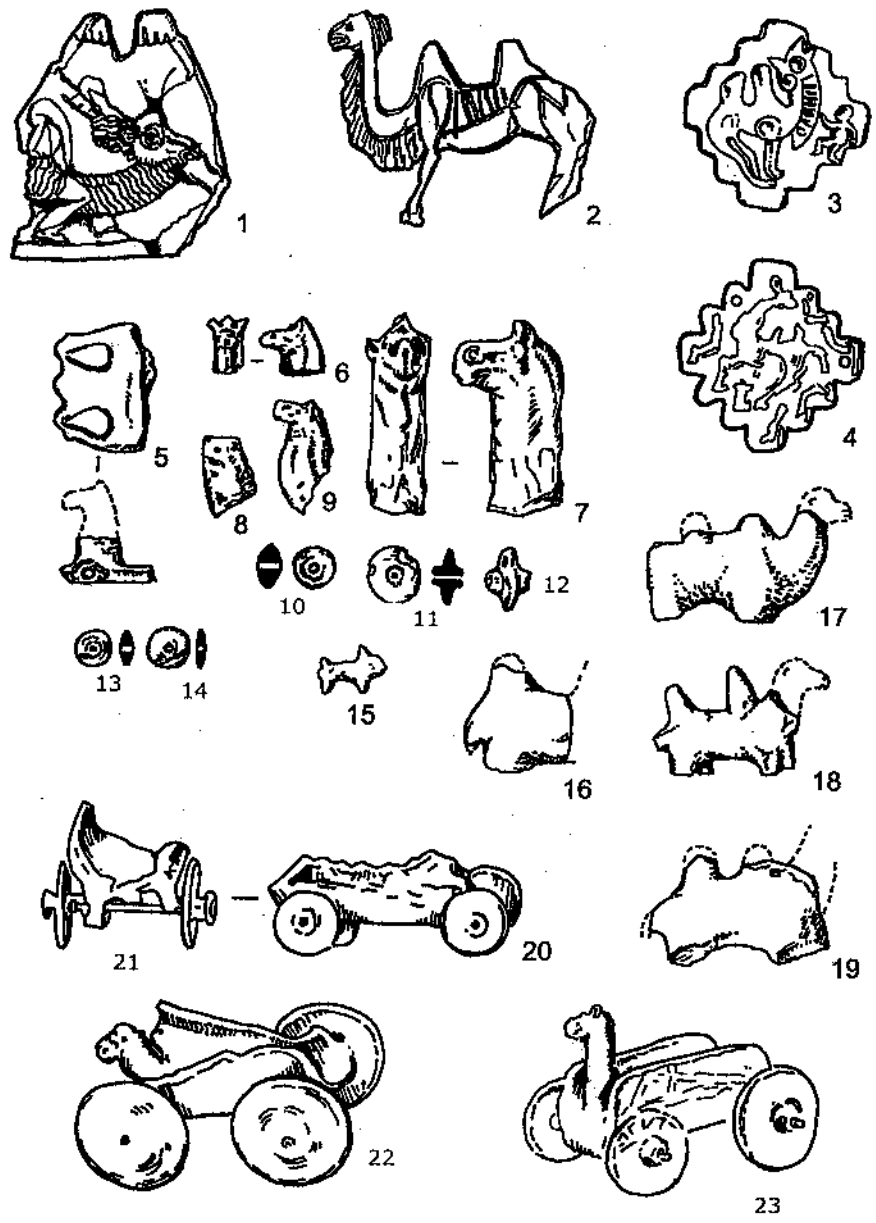


Figure 33. Cars and Bactrian camels in South Central Asia
1–2, 16–Gonur; 3–Bactria; 4–Sapalli-tepe; 5–11, 15, 22, 23–Altyn-depe; 12, 20, 21, - Namazga-depe; 13, 14–Kara-depe; 17, 19–Togolok I; 18–Togolok III; (1, 4–stone, others clay)

Figure 34. Bactrian camels on petroglyphs in Central Kazakhstan and Kirghizstan

1—Arpauzen III; 2, 5, 9, 10—Koibagar III; 3, 4, 6, 7—Saimaly-Tash; 8—Koibagar II

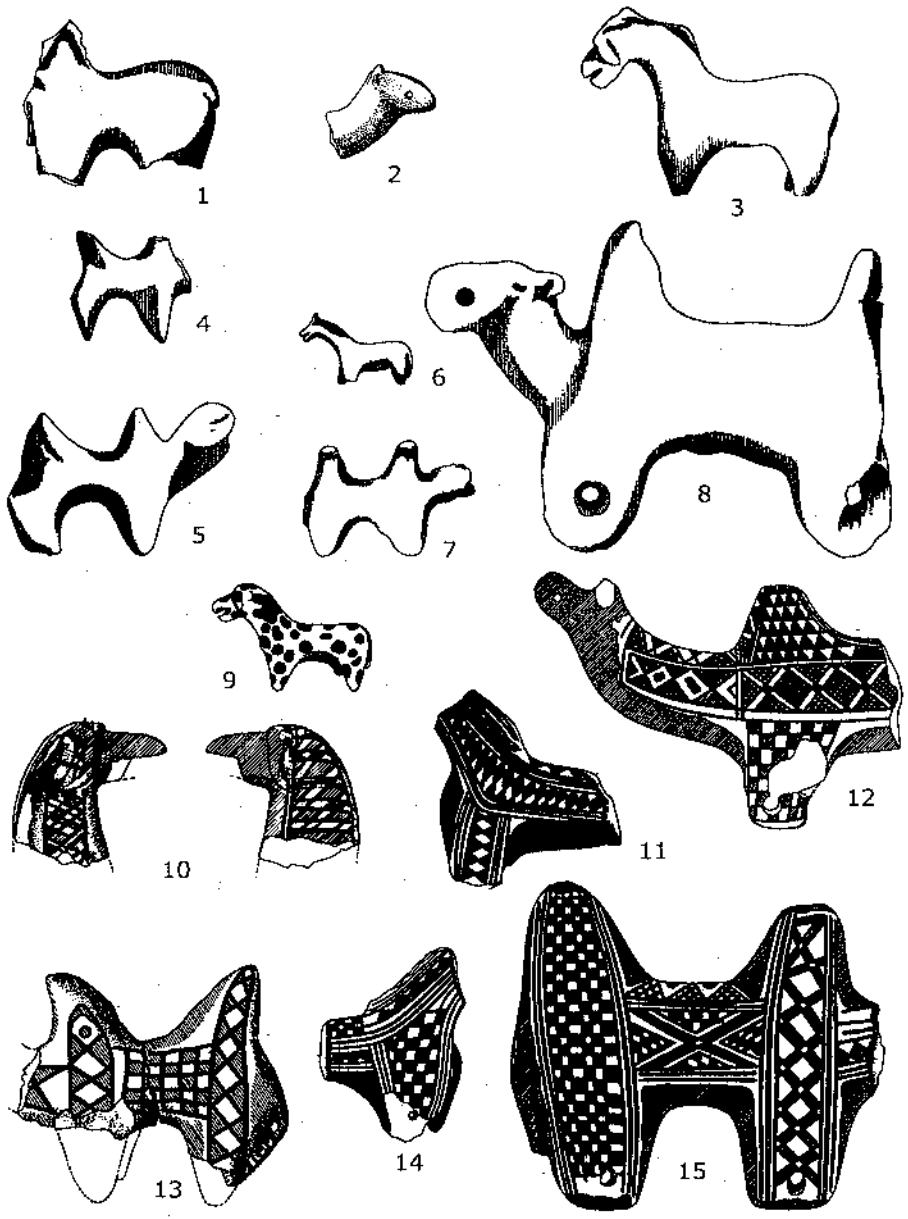


Figure 35. Clay figurines of horses and Bactrian camels in Pirak

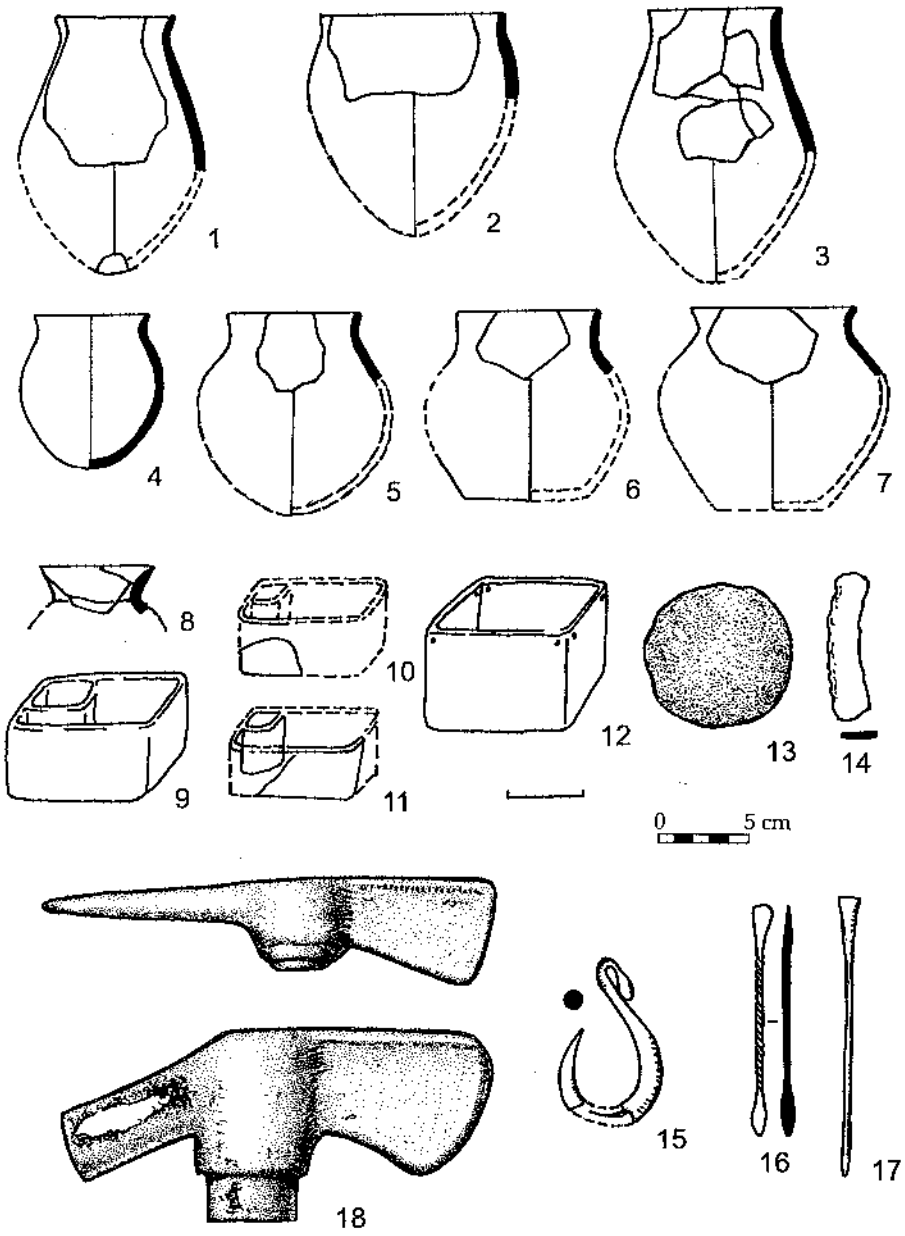


Figure 36. Complex of Zaman-Baba cemetery and Lyavlyakan hoard
1-12—pottery; 13-17—copper artifacts; 18—castings of axe-chisel and axe-hammer from Lyavlyakan hoard

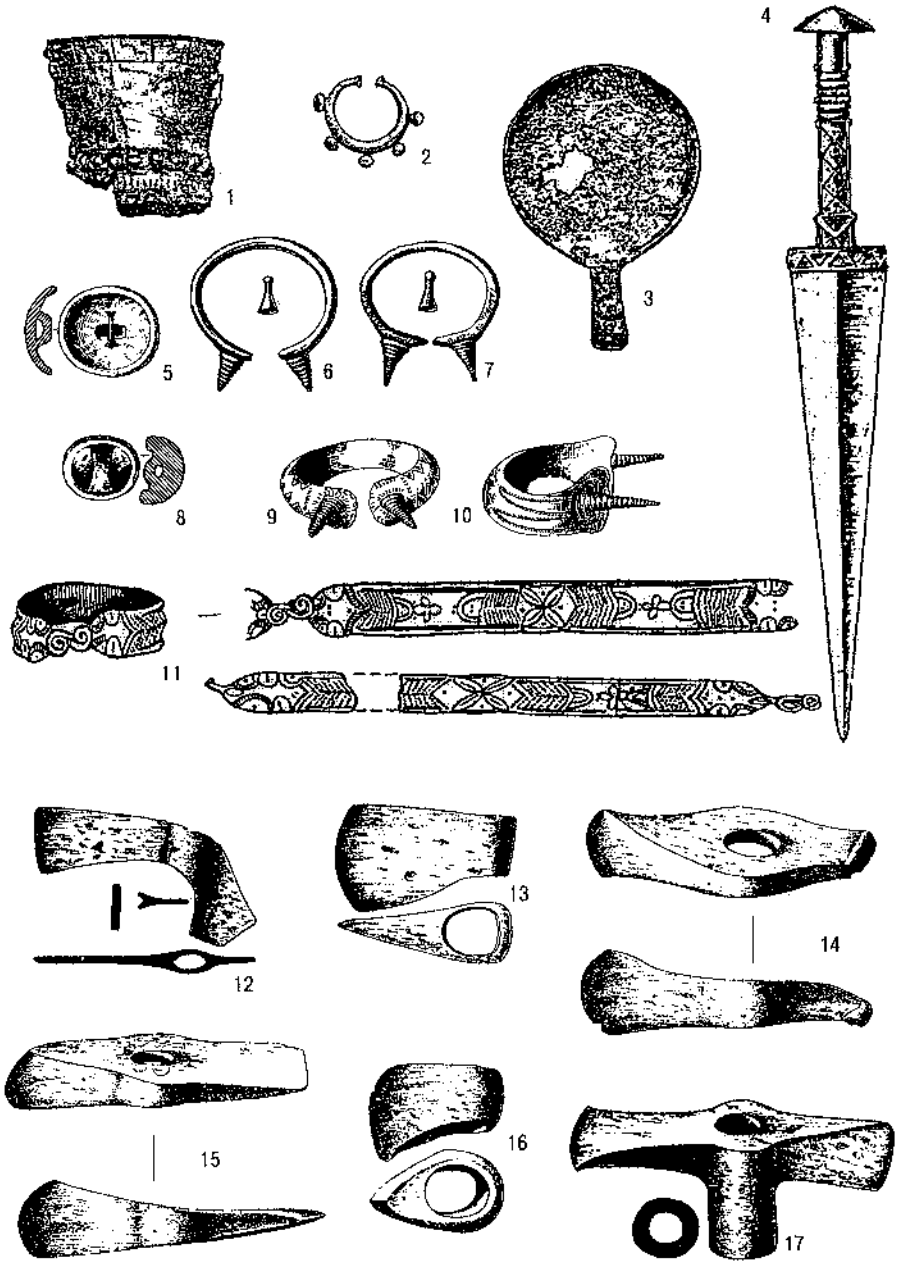


Figure 37. Metal artifacts of the Encolithic and Bronze Age from Central Asia
1, 2—Nurek; 3—Kara-Pichok; 4—Ramit; 5, 8—Brichmulla; 6, 7, 9—Iskander; 10—Uzgen; 11—cemetery Parhar; 12—Pul-i Khatun; 13—Sangvor; 14—Shar-Shar; 15—Jori-sai, Panjikent; 16—Arakchin; 17—Daina

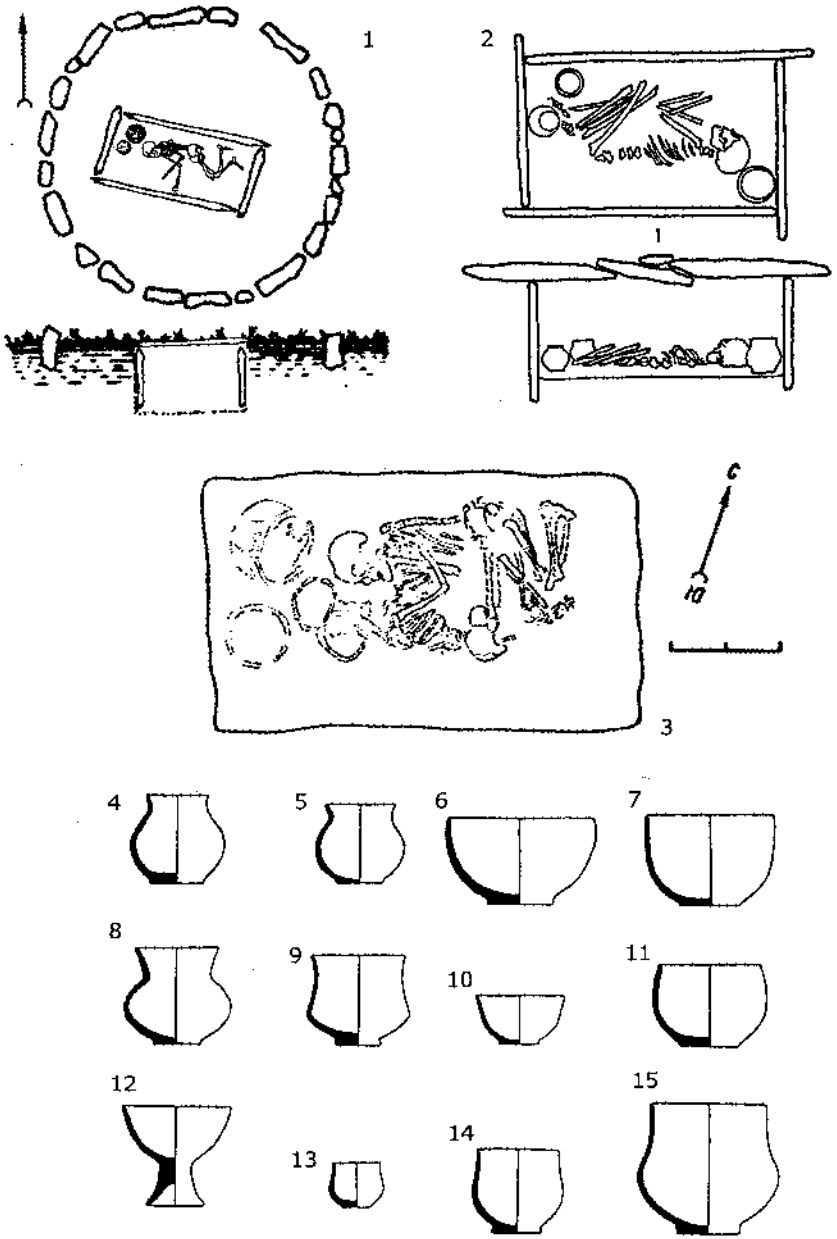


Figure 38. Andronovo-type graves and complex of grave and pottery from Kherai in Swat

1—Elenovka; 3—Baitu (the Urals); 2, 4–15—Kherai (4–15—pottery)

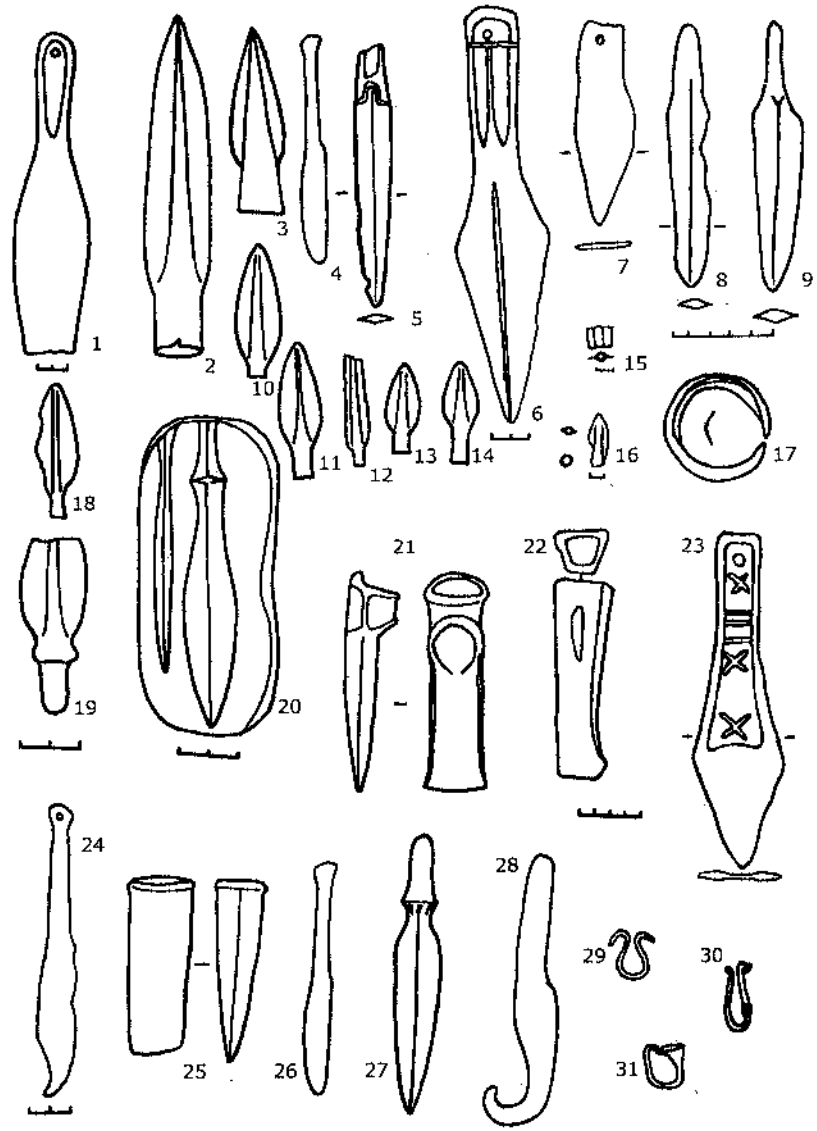


Figure 39. Andronovo-type bronze artifacts from South Central Asia and Afghanistan

Chance finds: 1—Vakhshuvar; 2—Samarkand; 3—Ashkhabad; 13—Bala-Ishem; 14—Uzbekistan; 15—well at Kuin-Kuyu; 27—Kulin-tepe; 28—Varakhsha; 29—Arsaf-sai; 30—Tashkent oasis;

Settlements: 6—Dashly; 12—Anau, South hill; 16—Togolok 2; 17—Tahirbai 2; 19—Shortughai, IIB; 24—Namazga-depe (excavations B.A. Kuftin, 1952); 25, 31—Kangurt-tut; 26—Karim-Berdy;

Cemeteries: 4—Bishkent II, grave 1; 5—Tigrovaya Balka, barrow 7; 7–10, 18—Tulkhar (7—grave 20; 8—grave 51; 9—grave 58; 10—grave 6; 18—grave 45); 11—Nurek; 20, 21, 23—Kum-sai (20, 21—grave 4; 23—grave 1); 22—Tandyryul;

(25—stone mold, others bronze)

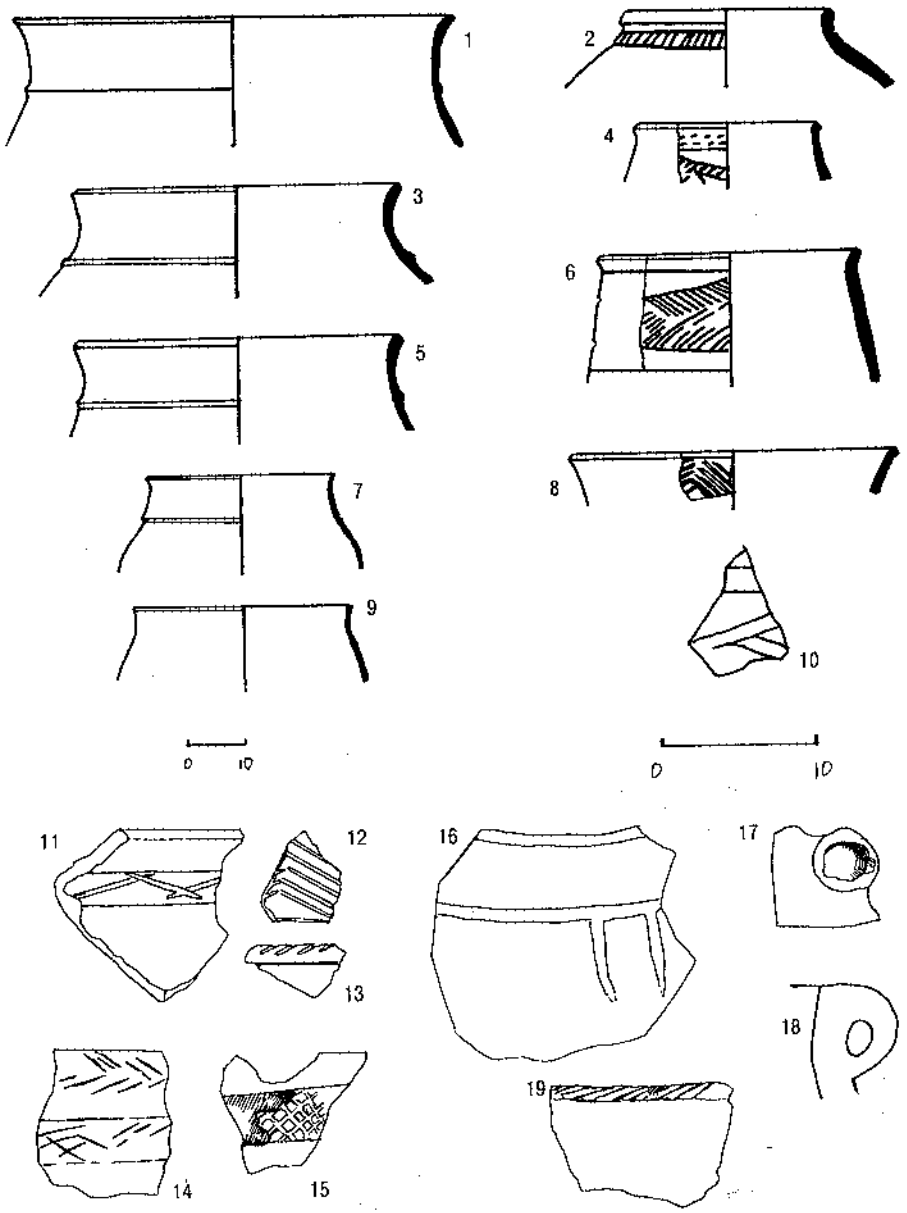


Figure 40. Late Andronovo-type pottery, including type with applied roller decoration from South Turkmenia and Afghanistan
Settlements: 1–10—Shortughai; 11–16—Elken-tepe; 17–19—Tekkem-tepe

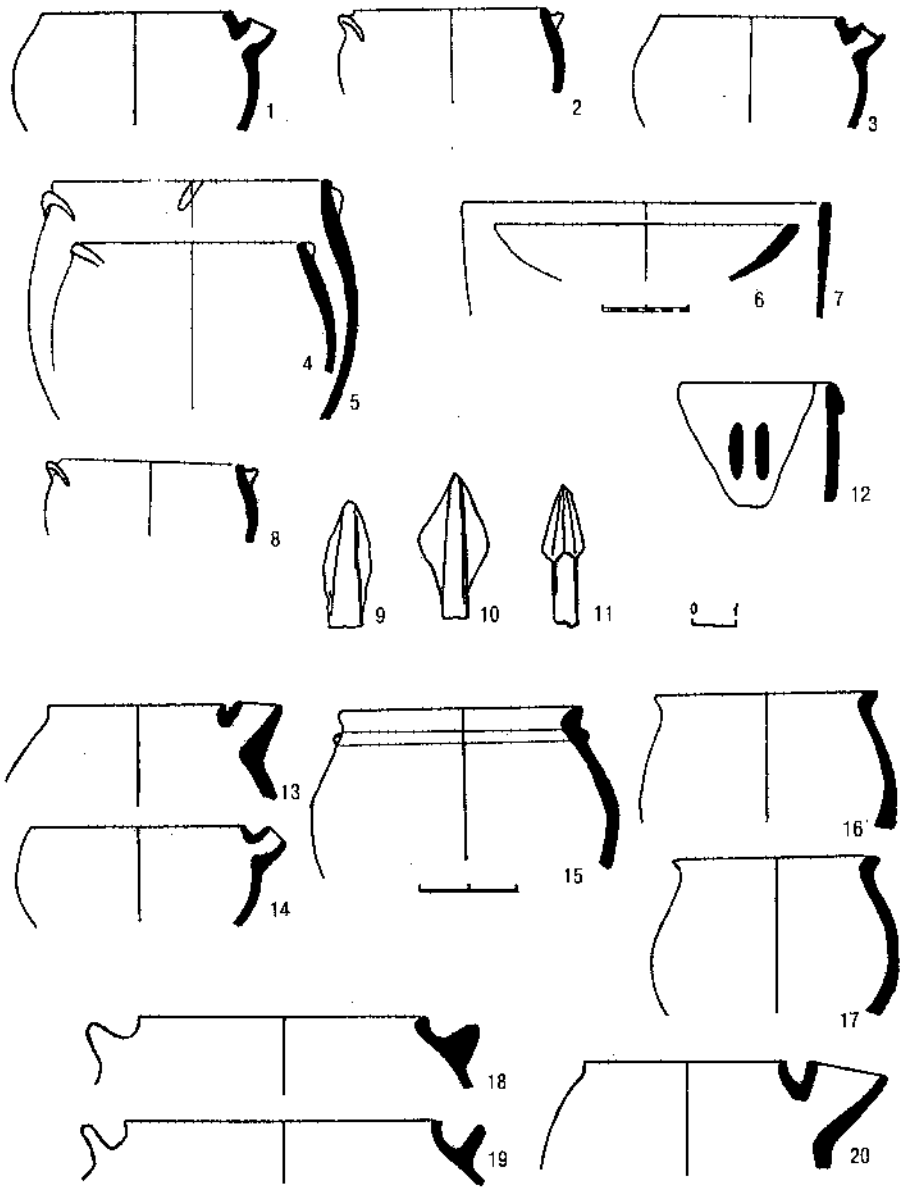


Figure 41. Arrows and pottery, including type with applied roller decoration and protuberances from Uzbekistan
Settlements: 1–12—Talashkan-tepe; 13–20—Kuchuk-tepe, level IA

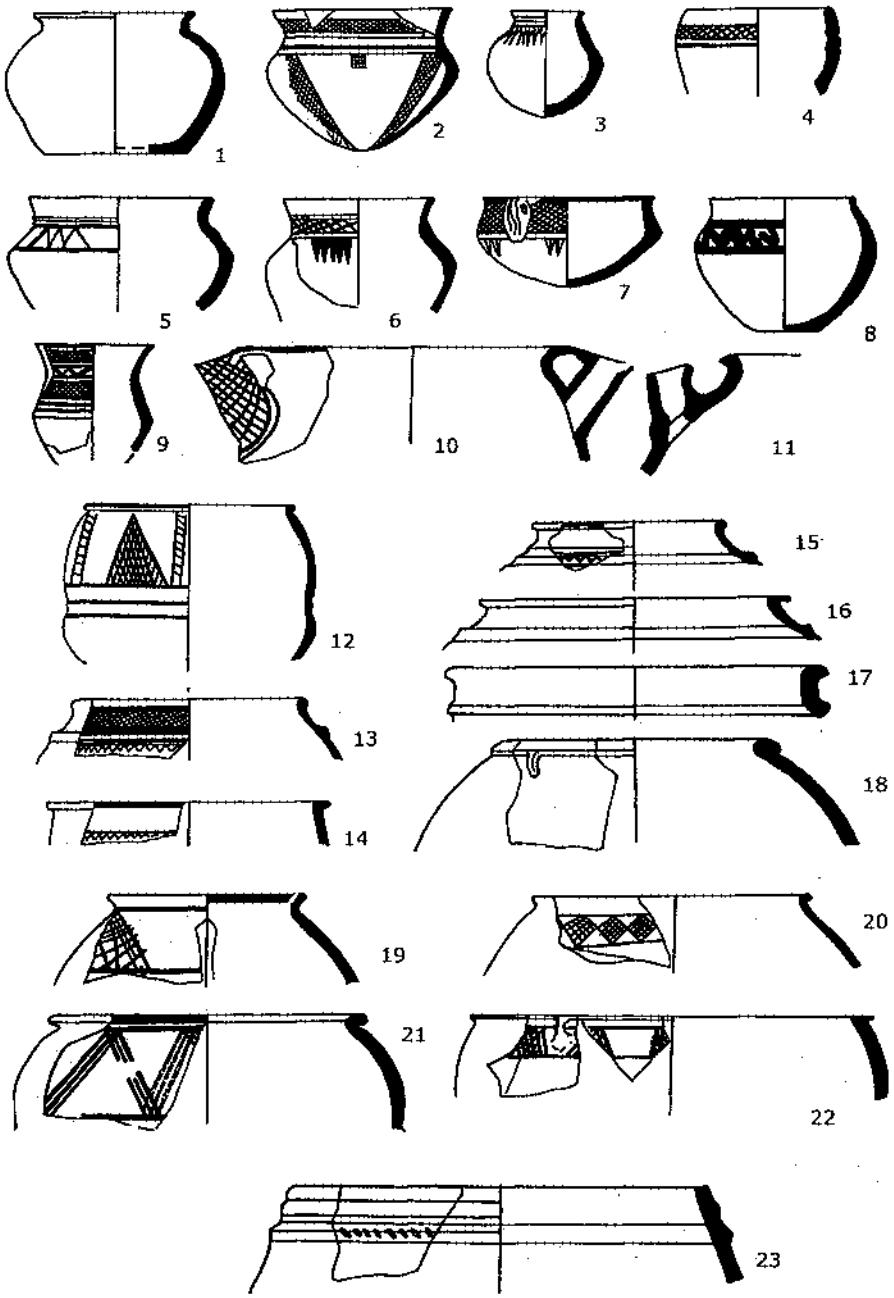


Figure 42. Pottery painted and with applied roller decoration, Mundigak settlement
1–14—period V; 15–23—period VI

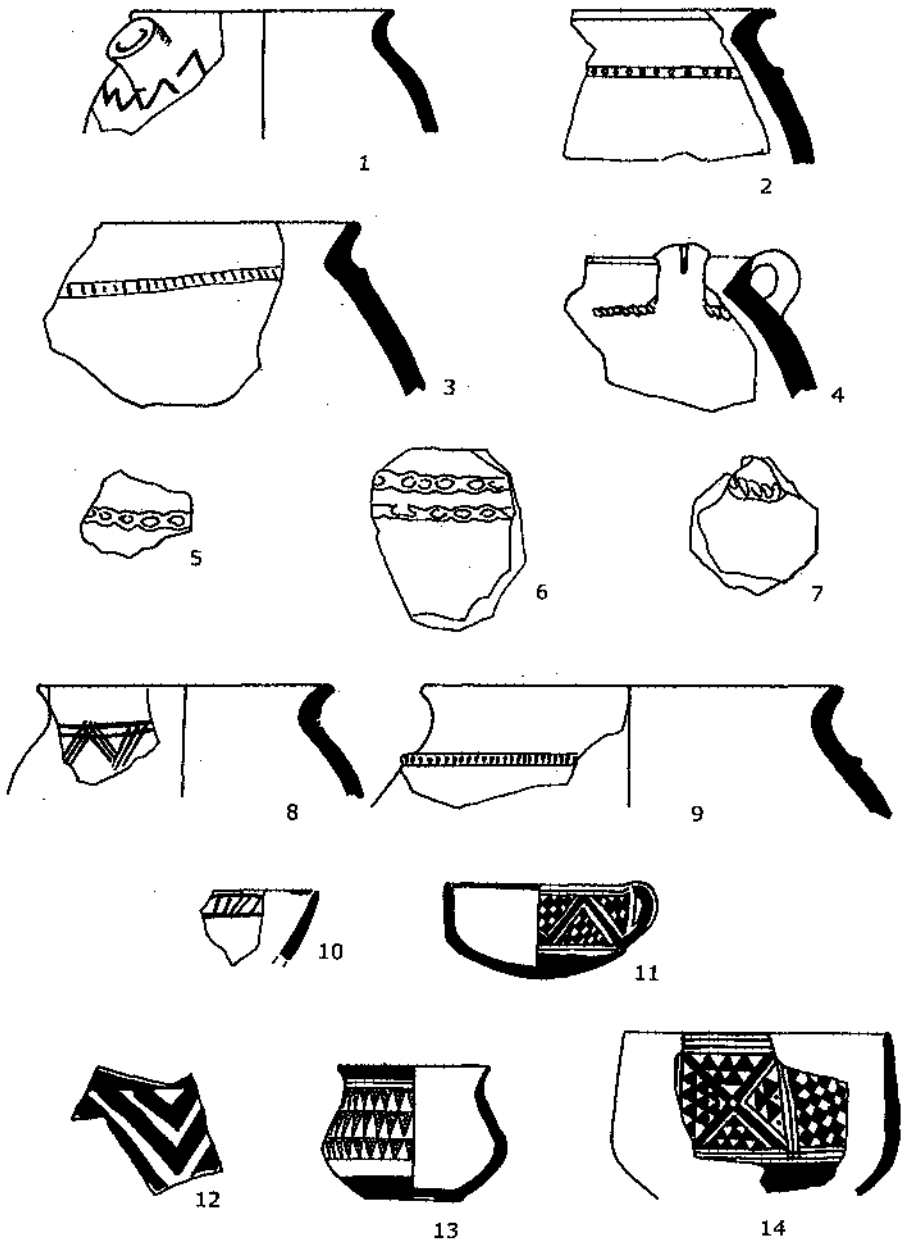


Figure 43. Pottery painted and with applied roller decoration, Pirak settlement (period II)

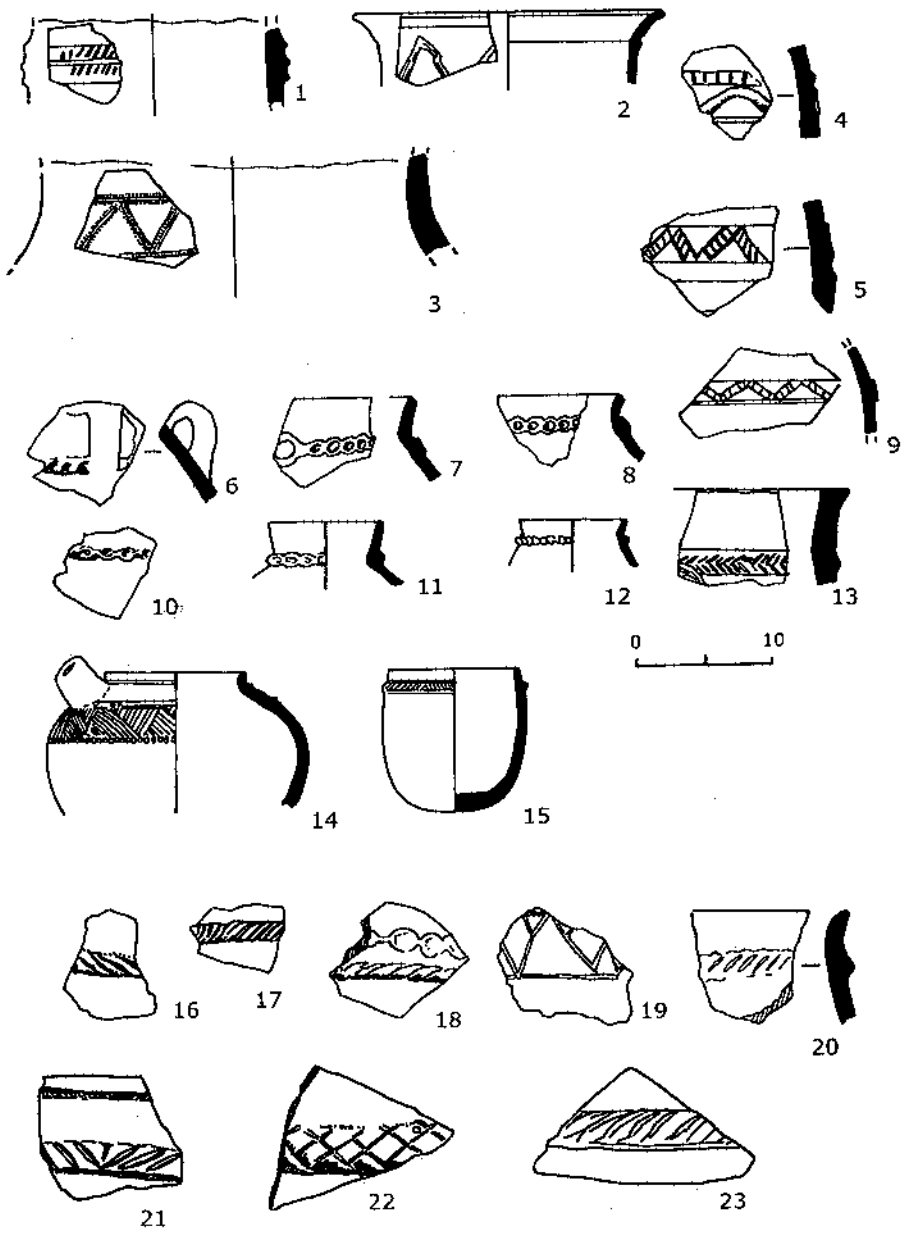


Figure 44. Pottery with applied roller decoration (appliqué ware) from Hindustan and Baluchistan

1–3—Tulamba; 4, 5, 9, 13—Durrah-e-Bast ware, Makran; 6, 10, 14, 15—Pirak; 7, 8—Dur-Khan; 11, 12—Patani Damb; 20—Rana-Ghundai, surface; 21–23—Mohul-Kala

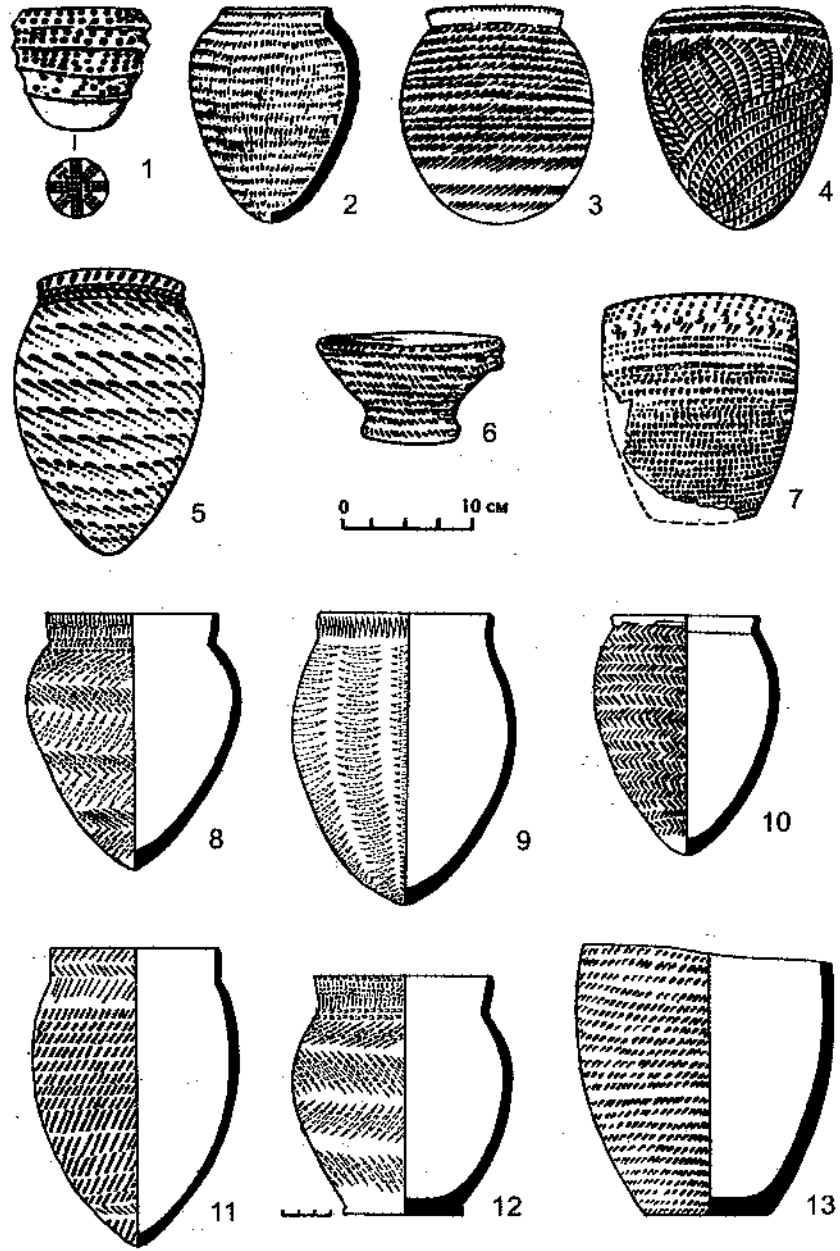


Figure 45. Afanasievo Culture pottery

Cemeteries: 1–7—Afanas'eva Gora; 8, 9, 13—Nizhnii Tumechin; 10, 11—Barsuchikha IV; 12—Kuyum

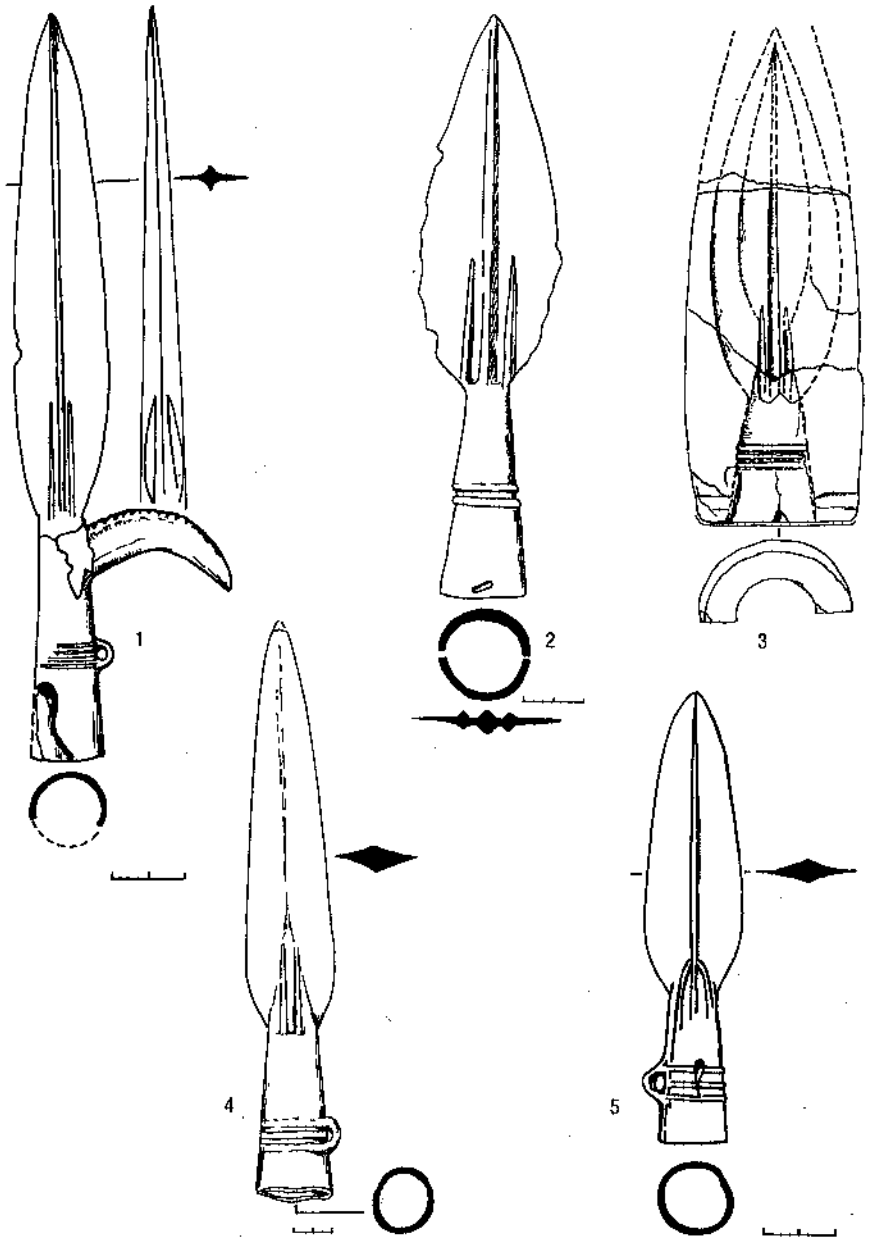


Figure 46. Spears from the Altai
Chance finds: 1–Charysh; 2–Souzga; 4–Parfenovo; 5–Burla; 3–Kalantyr' settlement (stone mold)

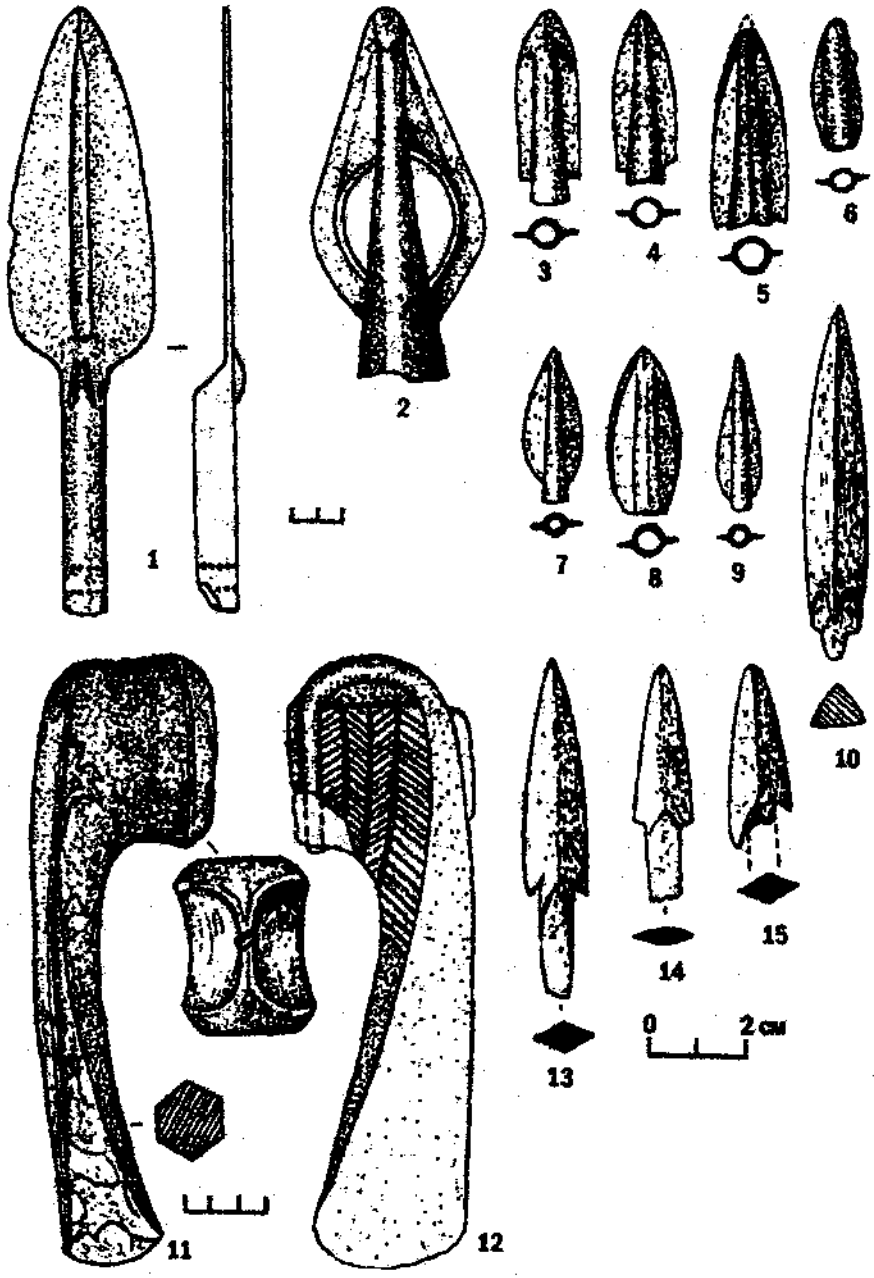


Figure 47. Alekseevka-type armament from the Altai (after Ivanov 2005, fig. 1)
Settlements: 1–Kurcika; 2–Bukanskoe; 10–Sovetskii Put'; 11–Krestyanskoe; 13–15–Rublevo VI; others chance finds

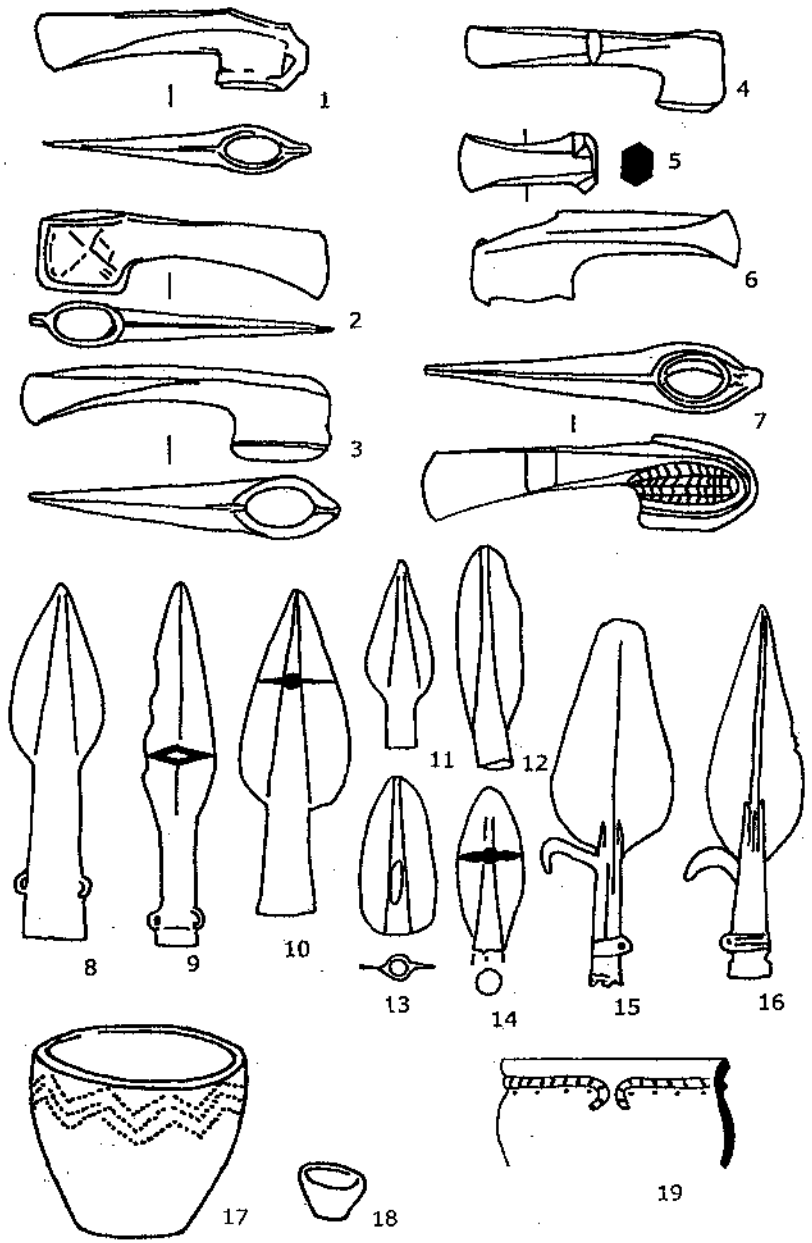


Figure 48. Bronze armament and pottery from Siberia, Xinjiang, and Mongolia
1–Urlapovo; 2–Shemonaikha; 3–Krestyanskoe; 4, 6 – Guchung [Qitai]; 5, 7–Chöchäk [Tacheng]; 8–10–China, Shang graves; 11–Krorän [Loulan]; 12–Gül Bagh [Huayuanzi]; 13–Yanbulaq; 14–Qaraüzhmä [Qurangzima]; 15–Shenna, Qinghai; 16–Rostovka; 17, 18–Weisuo necropolis, Tacheng; 19–Uluz Verkhnekilgantui, grave 43 (Mongolia)

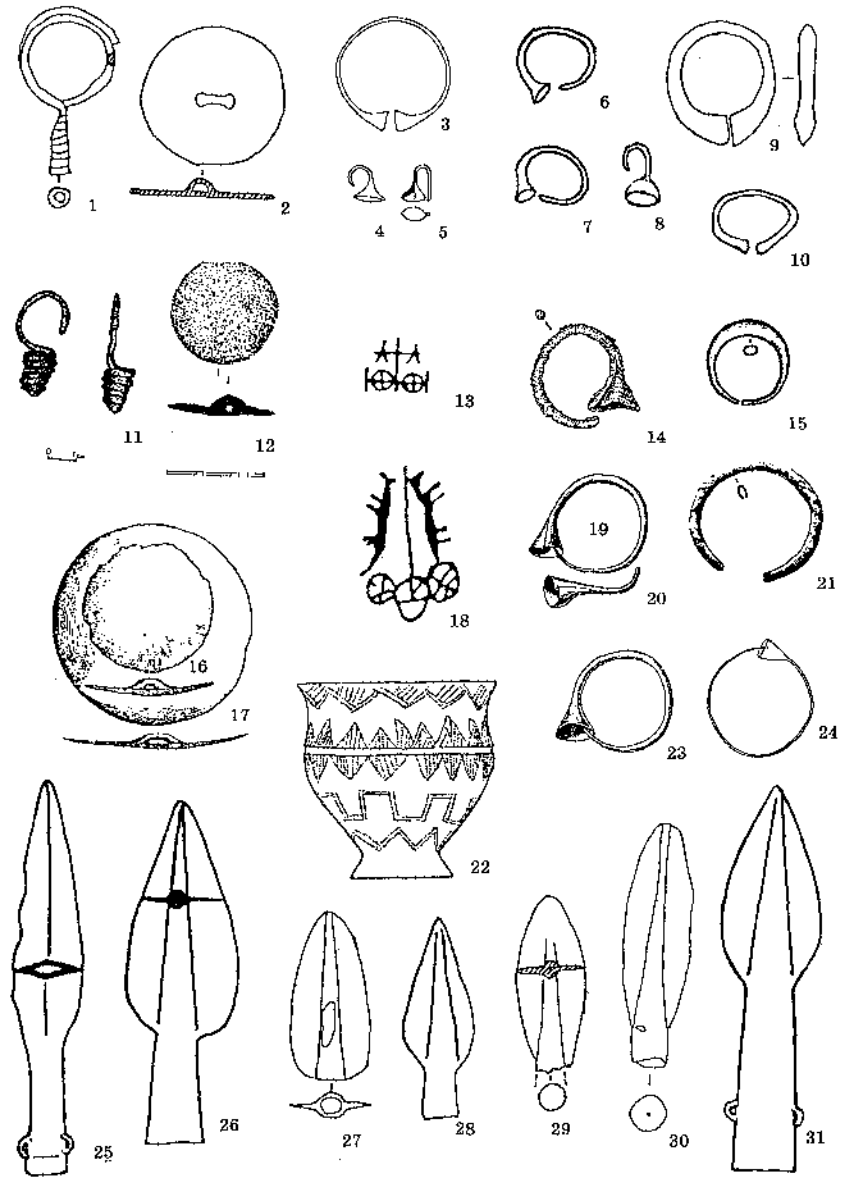


Figure 49. Andronovo pot, petroglyph, ornaments, and armament from Xinjiang, China, Ferghana, and Semirechye
1, 2, 9, 27–Yanbulaq; 3–Gansu; 4, 8, 10–Liujiahai; 5–Xiajiadian; 6, 7–Dun Bei; 11–Tamgaly; 12, 14–Kul'-sai; 13–the Chinese character for chariot; 15, 21–Begazy; 16, 17–Shamshi hoard; 18–petroglyph at Ge'er Huobadeheshan (the Pamirs); 19, 20, 23–Tash-Tyube II; 22–Saz [Tacheng]; 24–Vuadil'; 25, 26, 31–Shang graves in China; 28–Loulan; 29–Qaraüzhmä [Qurangzima]; 30–Gül Bagh [Huayuanzi]

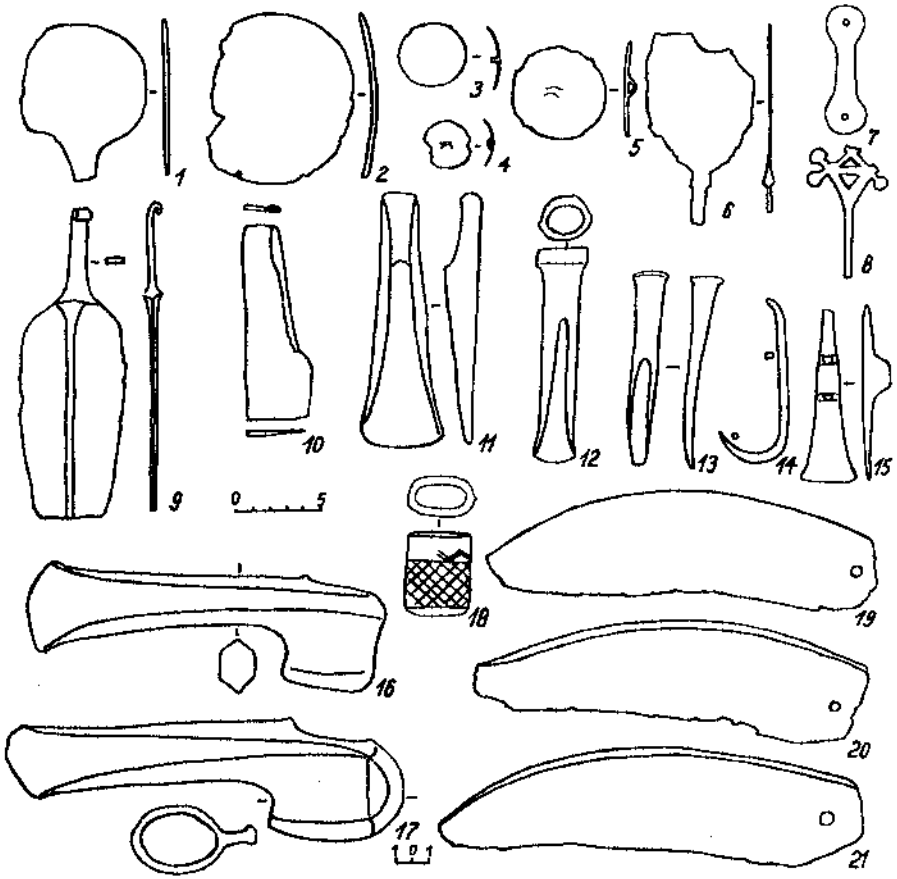


Figure 50. Shamshi hoard (bronze)

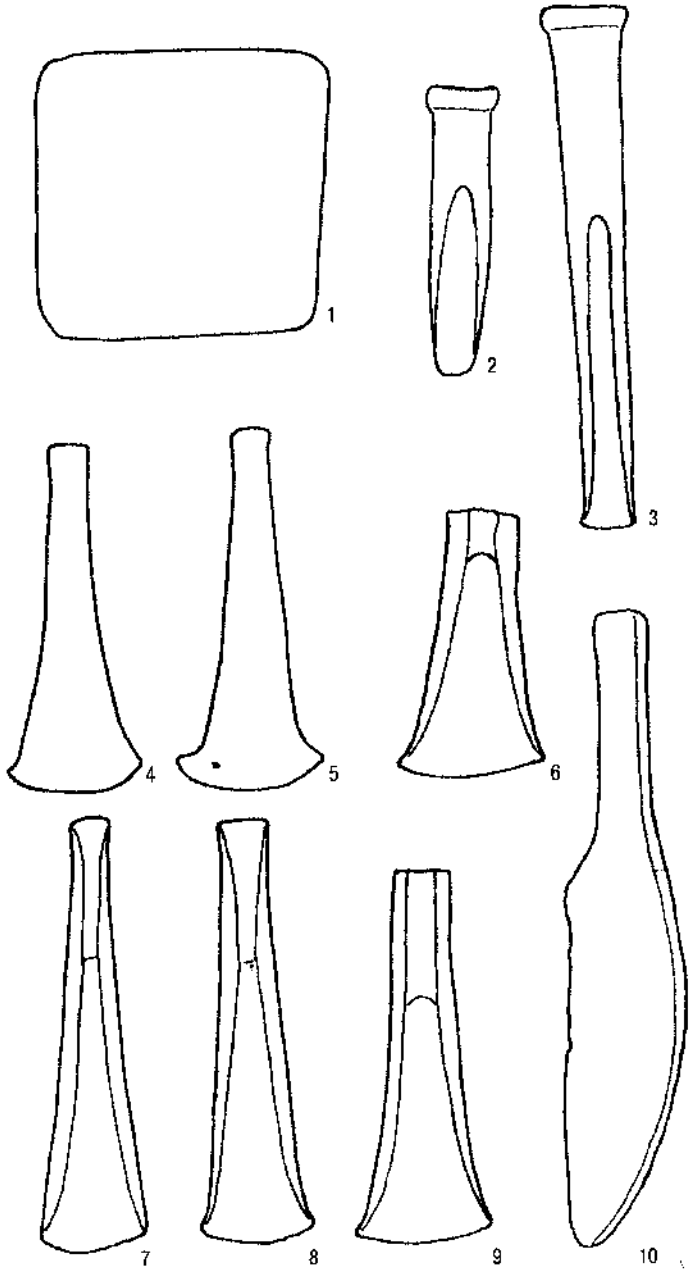


Figure 51. Tuyuq hoard (bronze)

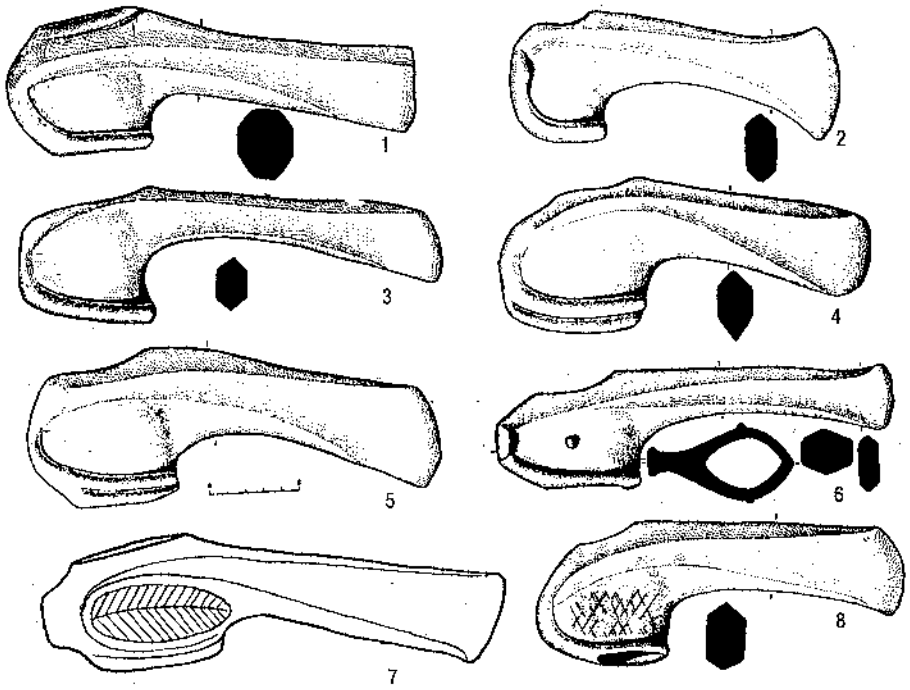


Figure 52. Andronovo-type axes from Kirghizstan, Ferghana, and Xinjiang
Chance finds: 1—Novo-Pavlovka; 2—Ivanovka; 3—Kairakkum settlement (molding);
Hoards: 4, 5, 8—Sukuluk; 6—Issyk-kul'; 7—Agharsin

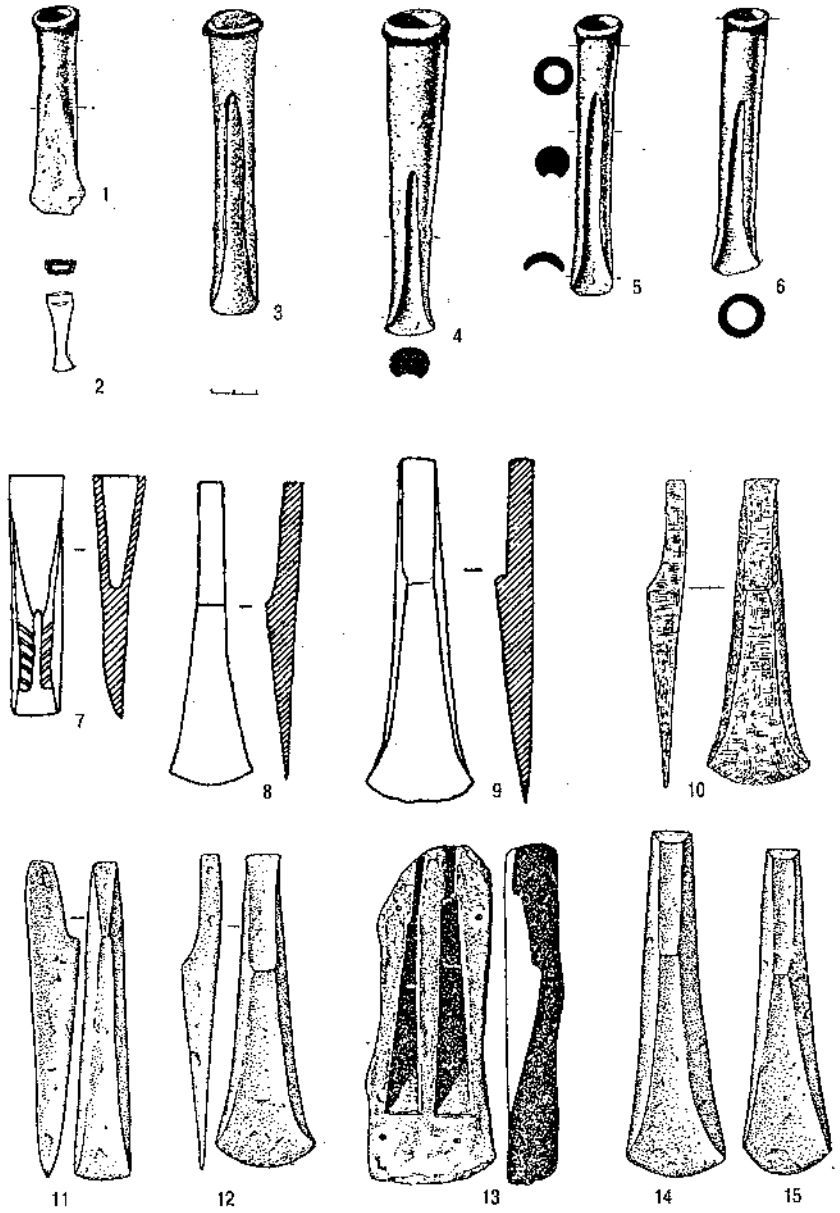


Figure 53. Bronze chisels and gauges from Semirechye, Ferghana, and Xinjiang
Chance finds: 1, 15—Bishkek; 7—Ili; 8—Ürümchi; 11—Karakol; 13—Aleksandrovka (stone mold);
Hoards: 2, 3, 10—Agharsin (after photograph of An Zhimin 1998: 3); 5, 14—Sadovoe; 6, 12—Sukuluk; 9—Tuyuq; 4—Dalverzin settlement

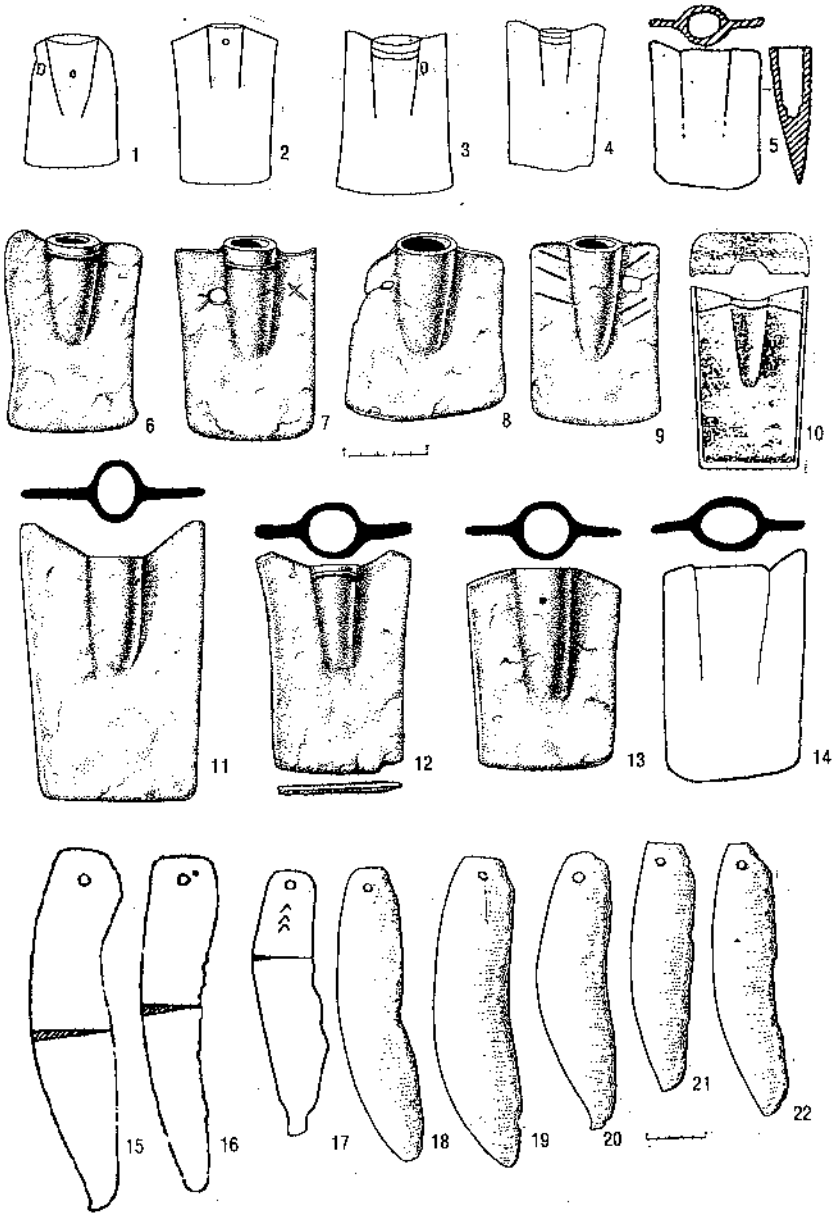


Figure 54. Bronze celt-spades and sickles from Asian Steppes and Xinjiang
1, 3–Kurchum; 2–Central Asia; 4, 6–Novopavlovka; 5–Ürümchi; 7–Bishkek; 8–Kant; 9–Ivanovka; 10–Samus' IV settlement (stone mold); 11–Tyup; 12–Ringitam'; 13–upper Syr Darya; 14–16–Chöchäk [Tacheng]; 17–Agharsin; 18, 19, 21, 22–Chu river canal; 20–Ivanovka

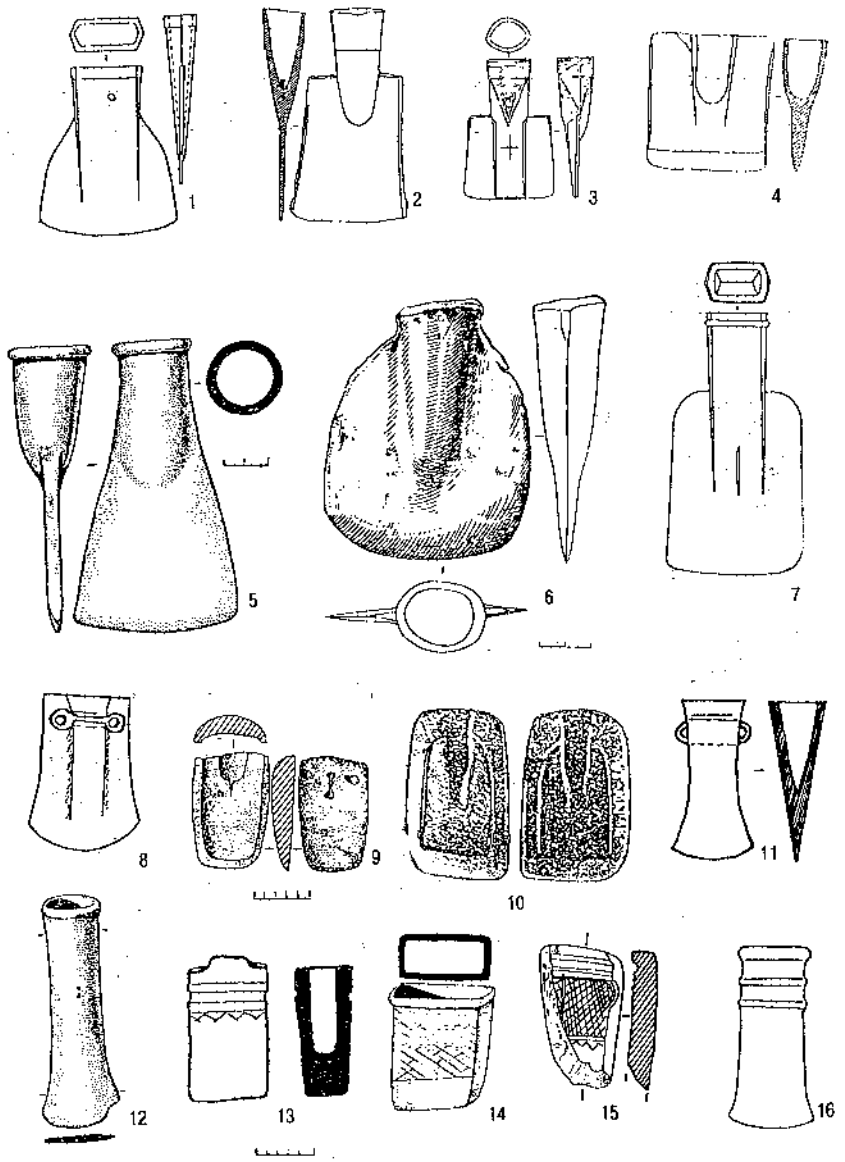


Figure 55. Bronze celt-spades and celts from China, Xinjiang, Ferghana, Semirechye, and Siberia
1–3, 7–Shang graves, China: 1–Xing'an; 2, 3–Fu Hao tomb; 7–Baxikong-cun;
Chance finds: 4–Chöchäk [Tacheng]; 5–Lebedinovka; 6–Dzhappa; 8–Usinskoe; 9–Ozernoe; 10–Keremchi; 11–Qumul [Hami]; 16–Yengidala [Xintala];
Hoards: 12, 14–Sadovoe; 13–Agharsin; 15–Zhukaigou site, period 5

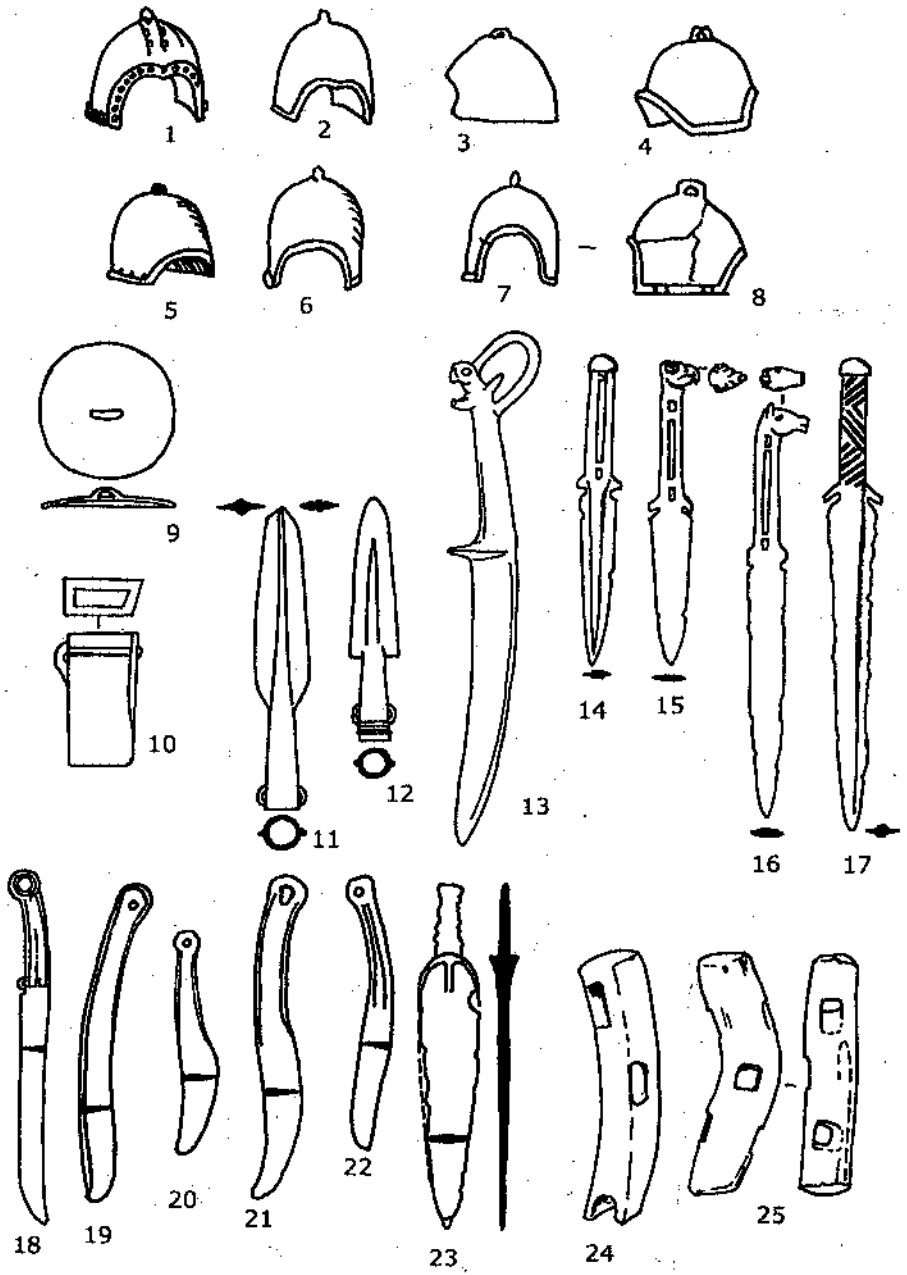


Figure 56. Bronze helmets, mirror, knives, daggers, and bone cheek-pieces from China and northern provinces

1–8—China; 9, 19–23—cemetery at Tianshanbeilu; 10–12, 14–17—Baifu, near Beijing; 13—Fu Hao tomb; 18—Zhukaigou, phase V; 24, 25—Xincun

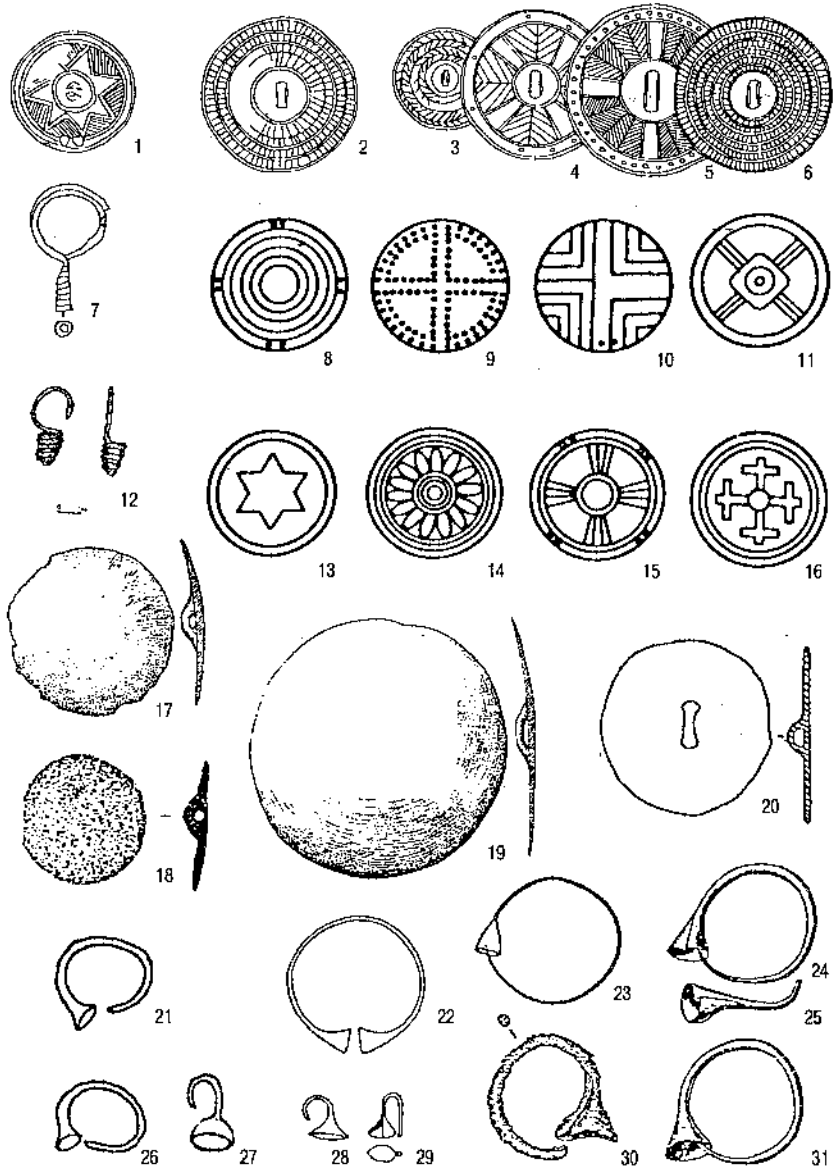


Figure 57. Mirrors, plates, earrings, and temple-rings from Asian Steppes, Xinjiang, Inner Mongolia, and China

1—Inner Mongolia; 2—Naimaitai, Qinghai; 3–6—grave of Fu Hao; 7, 20—Yanbulaq; 21, 26—Dunbei; 22—Gansu; 27, 28—Liujiahai; 29—Xiajiadian; Andronovo cemeteries: 8—Tasty-butak; 9, 10—Borovoe; 11, 16—Bylkyldak I; 12—Tamgaly; 13—Bylkyldak III; 14—Alakul; 15—Alekseevka; 18, 30—Kul'-sai; 17, 19—Shamshi hoard; 23—Vuadil'; 24, 25, 31—Tash-Tyube II; (bronze, bronze covered with sheet gold; gold)

Notes

Introduction

1. Editor's note: The Introduction is particularly valuable for its review of the literature on "mobile pastoralism" and especially for its account of the role of the Persians, who are often left out of the discussion by Western authors on the lead-up to the establishment of the Silk Road.
2. Editor's note: Bibliographical citations to Kuzmina without preceding initials refer to E. E. Kuzmina.
3. Editor's note: There were also some local sources of jade available to the inhabitants of the East Asian Heartland (EAH).

Chapter 1. The Dynamics of the Eurasian Steppe Ecology

Note to epigraph: F. Braudel, *The Structures of Everyday Life: The Limits of the Possible* (London, 1981–84), p. 62.

Chapter 2. Economic Developments in the Ponto-Caspian Steppe

1. S. Bökönyi's assumption of a local secondary center of the domestication of cattle and the pig in Southeastern Europe has not been corroborated; although the ancestors of these animals were found in Eastern Europe, in Asia they had been tamed two millennia earlier, and along with the sheep and cereals presumably reached Europe. Only in Southeast Asia is there an assumption that there was an independent center of plant and animal domestication that later spread to China. But this issue remains debatable.
2. Shnirelman (1989, 177) admits tentatively the influence of the Caucasian center on the spread of sheep breeding.
3. Editor's note: Because it is virtually impossible to tell the difference between sheep and goat bones, they are usually called "sheep/goat bones" or "ovicaprid bones."
4. A kunga is an infertile cross between an onager (female) and an ass (male). Even the hybrid is very aggressive and impossible to domesticate. Hence, the supposition that many representations of equids in the ancient Near East depict onagers is incorrect.

5. The human populations of these cultures share genetic traits.

6. According to DNA studies, the wild tarpan appears to be most closely related to these early domesticated horses.

7. Editor's note: The author's discussion of the domestication of the horse may be supplemented by reference to the recent studies of archaeozoologists (or zooarchaeologists) such as Norbert Benecke, Angela von den Driesch, P. A. Kosintsev, Marsha Levine, and Sandra L. Olsen. In addition, the McDonald Institute Monographs on the exploitation of and adaptation to the Eurasian steppe that were published by Cambridge University beginning in 1999 provide a wealth of relevant information.

8. I express my deep gratitude for their valuable consultations.

9. Personal communication.

10. Editor's note: In Russian agriculture sam is the coefficient of a soil's yielding capacity: sam-1 means that a volume of grain sown gives the same volume of crop, sam-30 means that a volume sown gives a crop thirty times its volume, sam-200 means that it gives two hundred times the sown volume, and so on.

11. The interpretation of the clay models as cradles suggested by Izbitser has been disproved by the above-mentioned cult character of the images. The reconstruction of models from the Three Brothers burial mound by A. Häusler (1982) is convincing. Two models of two-wheeled vehicles are in V. A. Safronov's collection. The widespread opinion that vehicle models were toys is incorrect, because, first, these models could not roll (the draft animal figures that are part of the models are often wheelless); second, the Western Asian models are made of costly metal and extremely fragile; third—and most important—both in the Southern Russian Steppe and in the Danube Region the models were found in burials, and in Western Asia in Tel Agrab, a copper model was found in the closed complex of the temple devoted to Sin, the god of the moon. Some Hittite texts have survived that indicate that models of vehicles were kept in the temple of the god of vegetation (Kümmel 1967). Besides, it is undoubtedly cult vehicles that are represented on the seals, for they all feature the figure of a god. The meaning of vehicles in religious ceremonies and in the royal cult is well known. All this put together invalidates the interpretation of the two-wheeled vehicle models as children's toys.

Chapter 3. The Eurasian Steppe in the Bronze Age

1. Editor's note: MVK is the abbreviation of the Russian *mnogovalikovaya*, Multi-Roller Ceramic, i.e., "with multiple raised borders."

2. I would like to express my deep thanks to N. B. Vinogradov, G. B. Zdanovich, T. S. Malyutina, S. S. Kalieva, and other colleagues for their permission to study thoroughly the as yet unpublished materials of their excavations.

3. Editor's note: For a new set of ^{14}C dates pertaining to these sites, see N. L. Morgunova and D. S. Khokhlova, "Kurgans and Nomads: New Investigations of Mound Burials in the Southern Urals," *Antiquity* 80 (2006), 303–17.

4. I express my gratitude to V. S. Bochkarev, who drew my attention to this publication and provided me with pictures of the articles.

5. Editor's note: Current thinking among paleozoologists is that the dromedary was developed out of the domesticated Bactrian and that the wild ancestor of both is the wild Bactrian, so the dromedary in the Near East must have been later than the domesticated Bactrian in Central Asia.

Chapter 4. Archaeological Cultures of Southern Central Asia

1. At the present time it is impossible to determine more precisely the cultural origin of the sites. The opposite point of view was voiced by A. Askarov (1962a, b), who holds that these materials belong to the Andronovo Culture. S. P. Tolstov and M. A. Itina (1960) ascribe them to the Tazabagyab Culture and assume the movement of a part of the population from Khorezm.

2. The cause of the crisis of the Namazga VI Culture is interpreted in different ways: E. Schmidt (Pumpelly 1908) and A. A. Marushchenko (1959) believe that it succumbed to the pressure of the Steppe groups; B. A. Kuftin (1954) points out that this moment coincided with the approach of the xerothermic period; V. M. Masson (1959) assumes that an internal economic crisis took place in Southern Turkmenistan. It seems most likely that the domestic economic crisis weakened the Anau communities and largely cleared the way for the occupation of their territory by the northern peoples.

3. Editor's note: For an explanation of this term, see the Editor's Foreword.

4. A somewhat different point of view is held by V. M. Masson (1959; 1966).

5. A different point of view was expressed by B. A. Litvinsky (1963), who includes the sites of the Zeravshan in the Kairakum Culture. A. Askarov and Ya. G. Gulyamov (Gulyamov, Islamov, Askarov 1966) regard these sites, like those of Khorezm, as belonging to the Andronovo Culture.

6. S. P. Tolstov, who connected the origin of the Tazabagyab Culture with the arrival of the Volga Region's Timber-Grave population, voiced a different point of view. A. Askarov (1962b), following M. P. Gryaznov, considers the Tazabagyab sites as belonging to Andronovo proper.

7. A different point of view was advanced by Yu. A. Zadneprovsky (1966), who negated the separate Suyargan Culture and considered the late Suyargan and Tazabagyab sites to be a single entity.

8. Different points of view were offered by S. P. Tolstov (1962), who held that the Suyargan Culture representatives had come from the south, and by A. A. Formozov (1951), who understood the Kelteminar and Andronovo cultures to be closely related.

9. Dromos = passageway.

10. Editor's note: These groups were probably relatively sedentary, in contrast to the nomadic livestock-herders mentioned later in this sentence.

Chapter 5. Relations Between Eastern and Western Central Asia

Note to epigraph: V. Nabokov, *The Gift*, trans. Michael Scammell (New York, 1963), p. 136.

1. In the Pikshik burial ground of the Abashevo Culture of the second millennium B.C. on the Volga, graves were discovered with timber counter floors and frameworks, surrounded by rectangular and circular concentric fences of 1.5 m-high dug-in pales (Merpert 1961, 143–46, fig. 19). There are timber constructions over the graves in the Andronovo burial grounds of Tursumbai (the author's excavations) and Yurman (Savinov, Bobrov 1995).

2. Horse bones were found in the Afanasievo burial grounds of Afanasievo, Chernovaya VI, Letnik VI, Krasny Yar, Malyie Kopani, Tepsei X, Kuyum, Bike, and Elo.

3. V. A. Fisenko (1967) has suggested that the Catacomb people were Proto-Hittites.

4. The clay statuette and bronze pins of Zaman-Baba somewhat resemble the wooden figurine and bone pins of Gumugou (cf: Gulyamov et al. 1966, pl. V, 45; pl. XVI; Debaine-Francfort 1988, figs. 1, 5, 6).

5. The hypothesis of T. V. Gamkrelidze and V. V. Ivanov (1984) for the migration of the Tocharians is not confirmed by either archaeological or anthropological data.

6. The radiocarbon dates of the twenty-first–nineteenth centuries B.C. (Anthony, Vinogradov 1995) do not agree with the European chronological scale.

7. Editor's note: This is sometimes spelled *depe* in certain place-names. *Tepe* is a Turkic word meaning "hill, summit" and is used to indicate an artificial mound in place-names. Cf. *tell* or *tel*, which is derived from the Semitic root *tll*, signifying an ancient mound composed of the remains of successive settlements and often used in place-names of the Middle East.

8. It is not unlikely that the architecture of the settlement of Lanzhouwanzi goes back to Andronovo building traditions: a two-chamber house of 200 sq. m with walls made of stone blocks, support posts, and a round hearth.

9. Although the pastoralists of the Eneolithic period, who pastured herds of horses, did ride on horseback, they were not warrior-riders, as is shown by the fact that the bridle for restraining the horse and the set of weapons used appeared only at the turn of the second millennium B.C., which determines the time of the emergence of mounted warriors (cf. Kuzmina 1994c; 1996–97; Gimbutas 1977; Telegin 1986; Anthony 1995).

10. The oldest fragment of a silk fabric outside China was found in Uzbekistan at the settlement of Sapalli-tepe of the early second millennium B.C. (Askarov 1973, 133–34).

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The following abbreviations are used in the bibliography.

AAH: Acta archaeologica Hungarica. Budapest.
AMI: Archaeologische Mitteilungen aus Iran. Berlin.
AO: Arkheologicheskie otkrytiya.
ASGE: Arkheologicheskii sbornik Gosudarstvennogo Ermitazha. St. Petersburg.
BAEIAP: The Bronze Age and Early Iron Age Peoples of Eastern Central Asia, ed. V. Mair. 2 vols. Washington, D.C., 1998.
BASOR: Bulletin of American School of Oriental Research.
BMFEA: Bulletin of the Museum of Far Eastern Antiquities. Stockholm.
BMOIP: Byulleten' Moskovskogo obshchestva ispytatelei prirody. Moscow.
BVUIM: Bronzovyi vek Uralo-Irtyshskogo mezhdurech'ya. Chelyabinsk, Russia, 1984.
DKPP: Drevnie kul'tury Povolzh'ya i Priural'ya. Kuibyshev, Russia, 1978.
DSA: Dostizheniya sovetskoi arkheologii v XI pyatiletke. Tezisy. Baku, Azerbaijan, 1985.
EAF: Ethnographisch-archäologische Forschung. Berlin.
EAZ: Ethnographisch-archäologische Zeitschrift. Berlin.
EO: Etnograficheskoe obozrenie.
EW: East and West. Rome.
IAN KirgSSR SON: Izvestiya Akademii nauk Kirgizskoi SSR. Seriya obshchestvennykh nauk. Frunze, Kirghizstan.
IAN SSSR: Izvestiya Akademii nauk SSSR. Moscow.
IIGK: Istoriya Iranskogo gosudarstva i kul'tury. Moscow, 1971.
IMKU: Istoriya material'noi kul'tury Uzbekistana. Tashkent.
ITN: Istoriya tadzhikskogo naroda. Moscow, 1963. Dushanbe, 1998.
IzIS: Iz istorii Sibiri. Tomsk, Russia.
Izv. SOAN SON: Izvestiya Sibirskogo otdeleniya Akademii nauk SSSR Seriya obshchestvennykh nauk. Novosibirsk.
JIES: Journal of Indo-European Studies. Washington, D.C.
JRAS: Journal of the Royal Asiatic Society. London.
KD 1970: *Karakumskie drevnosti.* Ashkhabad, 1970.
KSIA: Kratkie soobshcheniya Instituta arkheologii. Moscow.
KSIE: Kratkie soobshcheniya Instituta etnografii. Moscow.
KSIIMK: Kratkie soobshcheniya Instituta istorii material'noi kul'tury. Moscow.
LOIA: Leningradskoe Otdelenie Instituta Arkheologii (Leningrad Department of Archaeological Institute). St. Petersburg.

MDAFA: Mémoires de la delegation archéologique française en Afghanistan. Paris.
MGU: Moscow State University.
MIA: Materialy i issledovaniya po arkheologii SSSR. Moscow–St. Petersburg.
MKhE: Materialy Khorezmskoi ekspeditsii. Moscow.
NAA: Narody Azii i Afriki. Moscow.
PAPP: Problemy arkheologii Povolzh'ya i Priural'ya. Kuibyshev, Russia, 1976.
PAUKS: Problemy arkheologii Uralo-Kazakhstanskikh stepei. Chelyabinsk, Russia, 1988.
PAUS: Problemy arkheologii Urala i Sibiri. Moscow, 1973.
PDKK: Po sledam drevnikh kul'tur Kazakhstana. Almaty, Kazakhstan, 1970.
PIDO: Problemy istorii dokapitalisticheskikh obshchestv. St. Petersburg.
PIOP: Problemy izucheniya i okhrany pamyatnikov kul'tury Kazakhstana. Almaty, Kazakhstan, 1980.
PPS: Proceedings of the Prehistoric Society. London.
PRK: Poiski i raskopki v Kazakhstane. Almaty, Kazakhstan, 1972.
PSAH: Prehistoric Steppe Adaptation and the Horse, ed. M. Levine, C. Renfrew, and K. Boyle. Cambridge, 2003.
RA: Rossiiskaya arkheologiya. Moscow.
RiV: Rossiya i Vostok: problemy vzaimodeistviya kul'tury drevnikh narodov stepnoi Evrazii i fenomen protogorodskoi tsivilizatsii Yuzhnogo Urala. Part V, books 1–2. Chelyabinsk, Russia, 1995.
SA: Sovetskaya arkheologiya. Moscow.
SAA: South Asian Archaeology.
SAI: Svod arkheologicheskikh istochnikov. Moscow.
SE: Sovetskaya etnografiya. Moscow.
TIE: Trudy Instituta etnografii. Moscow.
TIIAE AN KirgSSR: Trudy Instituta istorii, arkheologii i etnografii Akademii nauk Kirgizskoi SSR. Frunze, Kirghizstan.
TIIAE AN TurkSSR: Trudy Instituta istorii, arkheologii i etnografii Akademii nauk Turkmenskoi SSR. Ashkhabad, Turkmenistan.
TIIYaL. Kirg. FAN SSSR: Trudy Instituta istorii, yazyka i literaturi Kirgizskogo filiala Akademii nauk SSSR. Frunze, Kirghizstan.
TKhE: Trudy Khorezmskoi ekspeditsii. Moscow.
TMOIP: Trudy Moskovskogo obshchestva ispytatelei prirody. Moscow.
TSGU: Trudy Samarkandskogo Gosudarstvennogo universiteta. Samarkand.
TYuTAKE: Trudy Yuzhno-Turkmenistanskoi arkheologicheskoi kompleksnoi ekspeditsii. Ashkhabad, Turkmenistan.
UAS: Ural'skoe arkheologicheskoe soveshchanie.
UIZh: Ukrains'kii istoricheskii zhurnal. Kiev.
USA: Uspekhi sredneaziatskoi arkheologii. St. Petersburg.
VANKazSSR: Vestnik Akademii nauk Kazakhskoi SSR. Almaty, Kazakhstan.
VDI: Vestnik drevnei istorii. Moscow.
VKKDTs: Vzaimodeistvie kochevykh kul'tur i drevnikh tsivilizatsii. Almaty, Kazakhstan, 1989.
VPAP: Voprosy periodizatsii arkheologicheskikh pamyatnikov Tsentral'nogo i Severnogo Kazakhstana. Karaganda, Kazakhstan, 1987.
ZDMG: Zeitschrift der Deutschen Morgenländischen Gesellschaft. Leipzig, Wiesbaden.

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